HAER No. CA-160

Bacon Island Road Bridge
(Bridge No. 29C-108)
Spanning Middle River between Lower
Jones Tract and Bacon Island
Bacon Island
Stockton Vicinity
San Joaquin County
California

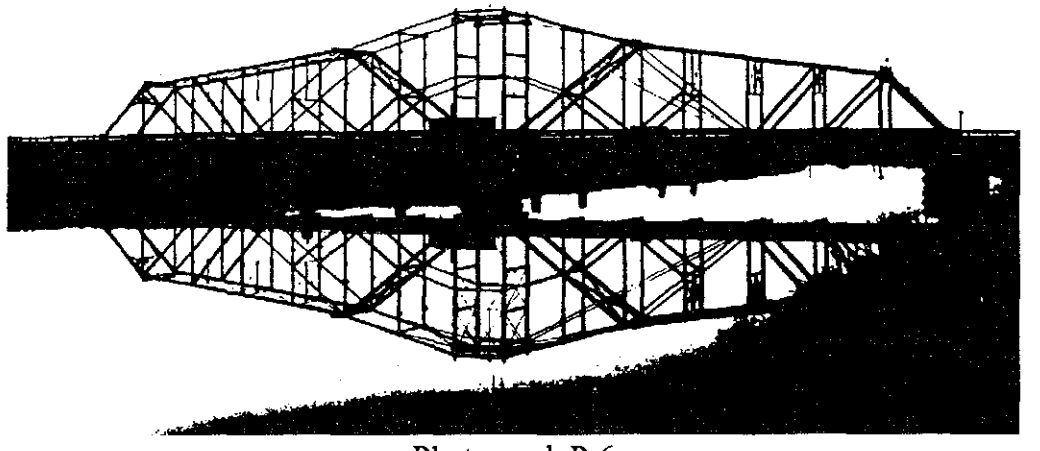
PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

Historic American Engineering Record
National Park Service
Western Region
Department of the Interior
San Francisco, California 94107

HISTORIC AMERICAN ENGINEERING RECORD
BACON ISLAND ROAD BRIDGE
(Bridge No. 29C-108)
HAER NO. CA-160

Location:	Bacon Island Road spanning the Middle River between Bacon Island and Lower Jones Tract Stockton Vicinity San Joaquin County, California USGS Woodward Island, 7.5' Quadrangle UTM Coordinates: 03.42018150.6294150 03.42017500.6297300
Date of Construction:	Circa 1906 - Grand Island over Sacramento River, Sacramento County
Date of Relocation:	Circa 1937 - Three Mile Slough, Highway 160, State of California
Date of Relocation:	Circa 1949 - Bacon Island over Middle River, San Joaquin County
Engineer:	Unknown
Builder:	Unknown
Present Owner:	San Joaquin County 1810 East Hazelton Avenue Stockton, California 95205
Present Use:	Vacant except for seasonal and on-call bridge tender operator
Significance:	The Bacon Island Road Bridge is the oldest highway swing span bridge in California. It is important in local history for its relation to agricultural and economic development in the Sacramento-San Joaquin Delta. It is the work of an unknown bridge company which utilized Carnegie Steel and U.S. Steel Company components. The bridge is eligible for a listing on the National Register of Historic Places.
Report Prepared by:	Kenneth A. Hill, Environmental Coordinator San Joaquin County Department of Public Works Post Office Box 1810, Stockton, California 95201 1810 East Hazelton Avenue, Stockton, California 95205 (209) 468-3000
Date:	June 30, 1995



Photograph P-6

I. DESCRIPTION

Bacon Island Road Bridge spans Middle River (Photograph CA-160-06) between Lower Jones Tract and Bacon Island in the Sacramento-San Joaquin Delta, western San Joaquin County, California (Drawings D-25 to D-31). The bridge is eligible for a listing on the National Register of Historic Places under National Register Criteria "C" (Photograph CA-160-01), [Werner, 1988].

This circa 1904 bridge (Drawings D-1 to D-4) was designed to provide access to an agricultural island across the Sacramento River. No longer do horse drawn carts, over-flowing with produce, thread upon its original wood deck in search of markets. The wood deck is gone, replaced in 1925 with concrete (Drawings D-4, D-13 to D-16), [Kalia, 1991]. The concrete deck is serviceable and has been patched with steel plate bolted to either side of the concrete slab joints to slow deterioration (Photographs CA-160-07 to CA-160-10). The horse drawn cart has been replaced by an 80,000 pound tractor-trailer truck. Two-way traffic is no longer permitted. The bridge is currently limited to one truck at a time, at a speed of five miles per hour, due to the aged condition of the structure [Kalia, 1991].

The decorative railings are gone (Drawing D-3), replaced in 1925 by steel lattice (Photographs CA-160-07 and CA-160-08). The asymmetrical trusses and four steel towers, forming the center section of the swing span, have had additional structural support added to extend its useful life. However, time, rust and heavier than designed for use have exacted a heavy toll. The bridge, as it stands today, has exceeded its economic life and epitomizes functional obsolescence (Photographs CA-160-08, CA-160-14 to CA-160-15), [Kalia, 1991].

Location

The bridge was originally erected circa 1906 in Sacramento County (Map M-1) and spanned the Sacramento River to Grand Island (Drawings D-1 to D-4). It was moved down the Sacramento River by barge to span Three Mile Slough, circa 1925 and moved again to its present location, circa 1949 (Drawings D-5 to D-9 and D-10 to D-12). The Bacon Island Road Bridge spanning Middle River, Stockton Vicinity, San Joaquin County, California (Maps M-1 to M-3) has served the Bacon Island area for better than 45 years.

Directions

To get to Bacon Island Road Bridge from downtown Stockton, take the Crosstown Freeway west, turn south onto Interstate 5, then west onto State Route Highway 4 for approximately 8.8 miles to Bacon Island Road (Map M-3).

A winding, two lane, levee road is the only paved access road to Bacon Island. The mainland approach onto Bacon Island Road Bridge is from the east. The west approach is from Bacon Island via a 700-foot long timber trestle bridge (Drawings D-25, D-28 and D-29) (Photograph CA-160-02) and is approximately 6.8 miles from State Route Highway 4, just past Bull Frog Landing Marina (Photograph CA-160-03). The asymmetrical steel trusses and steel towers (Photograph CA-160-02) rise above the San Joaquin Delta Tules one mile to the north.

II. ARCHITECTURAL & ENGINEERING INFORMATION

Historical Features

The swing span portion of the bridge is a circa 1904 design of riveted steel (Drawings D-1 to D-4) (Photographs CA-160-11 and CA-160-12). The swing span is in three sections. Two separate steel, asymmetrical through-trusses are supported by four steel central towers perched atop a central pivot pier (Drawings D-27 to D-28). The trusses are secured to the four central towers, via steel chords attached to upper truss member chords (Drawings D-17 and D-18). The overall length of the trusses and central tower platform is 335 feet (Photographs CA-160-03, CA-160-05 and CA-160-06).

The central towers rest upon a steel turn table assembly, attached to the center pier (Photographs CA-160-06, CA-160-08, CA-160-09 and CA-160-11). The turn table, (Drawings D-1, D-2, D-7, D-24, D-26 and D-27) over the life of the bridge, has been variously powered by man, electric motor and gasoline fueled engines

Historical Features, continued

(Photographs CA-160-04, CA-160-13 and CA-160-14). The engine, gear lever, hand brake lever, electrical panels, switches, traffic signal light and semaphore controls are all housed within the Engine House. The Engine House is attached outboard of the two south steel towers of the span (Photographs CA-160-08, CA-160-14 and CA-160-15).

The bridge railing, running parallel to the deck, was originally ornate (Drawings D-2 to D-4). It was similar to the architectural design features found at either end of the trusses and at the top of the steel towers (Photographs CA-160-11, CA-160-12 and CA-160-13). Unfortunately, the architectural detailing of the rails was replaced with an utilitarian steel lattice by the State of California circa 1925 (Drawing D-17) (Photographs CA-160-07 and CA-160-12).

The distinctive architectural features of the bridge have sustained considerable damage over the years. Agricultural use of the bridge precipitated the replacement of the classic timber floor in 1925 in order to accommodate the weight, stresses and capacities of higher speed vehicular traffic (Drawings D-13 to D-16).

Operation and Use

A bridge tender operator (Beasom, 1995), upon receiving a radio call, phone call or horn signal from an approaching vessel, alerts vehicular traffic by a siren, lowers the semaphore (gates) and closes the bridge to all vehicles. The operator then removes two locking pins, inserts a socket wrench of extraordinary proportions into the deck. The operator rotates the wrench (Photographs CA-160-04 and CA-160-08) to retract steel rollers at the east and west ends of the span. Once retracted, the ends of the swing span "float" above the concrete abutments to the bridge approaches. The swing span is now ready to rotate [SJC, Bridge Operation Instruction Sheet, 1992]. A motor is started in the engine house. A hand brake is set, shift lever and a clutch are manipulated (Photograph CA-160-14) in preparation to open the span.

The bridge operator squeezes the clutch, moves the shift lever and releases the hand brake to transfer power from the engine to the turning gear beneath the tower. The operator then adjusts the speed of the engine and the span rotates 90 degrees into the river traffic open position (Photographs CA-160-04 and CA-160-08). Closing of the bridge to river traffic is the reverse of the above process. The operator then resets the locking pins, repositions the steel rollers and brake, raises the gates and sounds the all clear for vehicular traffic. He then sounds an all clear and raises the semaphores to permit vehicular traffic over the bridge.

Present Condition and Use

The bridge is presently configured for vehicle traffic only, and contains no pedestrian sidewalks. The clear width of the bridge is 17 feet; it has been reduced to one lane (12 feet) by the installation of 6" x 7" asphalt concrete dikes. The vertical clearance at the truss is 14.7 feet. The floor beams consist of 10 inch x 25 foot steel "I" beams, with 10 inch x 15.3 foot steel channels, finished with 4.5 inch thick precast concrete deck panels, which have been patched with steel plates and bolts at all joints for reinforcement [SJC. Cassano, 1990], [Jones & Stokes, 1991].

A 1988, State Department of Transportation inspection of the Bacon Island Road Bridge revealed deficiencies indicative of age, metal fatigue, and rust [SJC. Reynaga, 1988]. The entire steel truss is covered with a blanket of rust with many steel members corroded with section loss. The concrete deck surface over the steel swing spans is in a very deteriorated state [SJC. Casssano, 1990].

Today, the Bacon Island Road Bridge is tired and worn out. The cost to rehabilitate exceeds the cost of erecting a new bridge across Old River or for relocating and rehabilitating at any other venue [SJC. Cassano, 1990] .

III. HISTORIC INFORMATION

Overview

Bacon Island Road Bridge, the oldest highway swing span bridge in California, was originally designed in 1904 and constructed by Sacramento County at Grand Island (Map M-1) over the Sacramento River circa 1906 (Drawings D-1 to D-4). The State of California acquired the bridge from Sacramento County circa 1935 and moved it by barge to Three Mile Slough. The bridge was renamed the Three Mile Slough Bridge and underwent several modifications before becoming an extension of State Highway Route 160, which permitted vehicular traffic access to Antioch southwest of Sacramento (Drawings D-5 to D-25).

The bridge was sold by the State of California to San Joaquin County and again floated by barge down river in 1947 to its present location on Middle River in San Joaquin County. A 700 foot long timber trestle (Drawings D-25 and D-29) connected the relocated swing span portion, perched upon a pivot pier, in Middle River (Drawings D-25 to D-29) to Bacon Island to the west. Concrete and wood rest piers were installed (Drawing D-30) as well as an approach ramp to the west, which completed the connection to Bacon Island Road on mainland Lower Jones Tract to the east.

Overview, continued

In 1969, San Joaquin County began regular inspections of bridges throughout the County [SJC. Downing, 1969]. These inspections document the steady deterioration of the Bacon Island Road Bridge due to heavy and more frequent truck farm use. Additional structural support was added, after considering two alternatives (Drawing D-31) to slow deterioration of the concrete slabs.

The County authorized load restriction postings on January 27, 1969, and reduced traffic to a single lane. Only one truck is permitted on the bridge at a time. The steadily increasing pleasure craft traffic requires more frequent bridge openings [Beasom, 1995]. This increases stress, wear and tear on the bridge pedestal moving parts and increases bridge operator fatigue. On heavy weekend pleasure craft traffic days, the bridge may be left in the closed position to vehicular traffic until a vehicle approaches to cross the bridge. Thus reversing typical weekday operation characteristics, where boats wait for cars to cross the bridge [Beasom, 1995].

Subsequent structural modifications and changes in use have exacted a heavy toll on the bridge, whose present use far exceeds those anticipated by its original designers.

Area History

The Sacramento-San Joaquin Delta (Maps M-1 to M-4) teemed with immigrant activity during the gold rush days of the 1850's [Anonymous. Haggin Museum, no date]. The rising populations of the cities and towns of the central valley depended upon the rivers of the Delta for transportation, food and water. The creation of islands within the Delta for agriculture was a dream come true on the backs of hard working immigrant labor.

1860's to 1890's man made levees and roads helped to drain the swamps, bogs and redirect the rivers of the Sacramento-San Joaquin Delta to reveal California's next golden bonanza, agriculture. The hundred plus year old 1,000 mile levee and river system, coursing through the Delta, converted thousands of acres of Delta wetlands into some of the most productive farmland in the world.

Thousands of acres of newly created farmland produced perishable crops needing fast transport to market. Originally, barges and ferryboats would travel back and forth from the islands to mainland markets with produce and workers, but this soon became impractical and expensive. Waiting for ferryboats slowed farm to market delivery. The invention of the caterpillar tractor and other farm equipment improved production and harvest. An alternative bridge construction techniques of the mid-1800's on the west coast

Area History, continued

was limited to mostly wooden structures. New steel manufacturing processes of the eastern steel and bridge magnates of the day made bridge building on the Delta a practical reality at the turn of the century. Relatively inexpensive gasoline powered vehicles increased the demand for paved roads and highways. This fueled the demand for steel draw or swing span bridges in the Delta, too. The dependence by Sacramento-San Joaquin Delta farmers on barges for delivery of crops grown on the nutrient rich peat farmland was drawing to a close [Anonymous. Haggin Museum, no date].

The "*Bridge Over the Sacramento River at Grand Island*" (aka Bacon Island Road Bridge) was one of the first successful steel swing span bridges constructed to satisfy both the land and river transportation needs of the day. Its style of construction made it easy to repair, modify, dismantle, move and reconstruct at two other venues during its 89 years.

The Bacon Island Road Bridge, as noted above, has been variously named, located and owned by Sacramento County, the State of California and by San Joaquin County, respectively. It was built to serve the growing transportation needs of Sacramento County over the Sacramento River. The bridge decking material was of wood then and designed to handle two lanes of vehicular traffic both motorized and horse drawn. It was initially the "*Draw Bridge at Grand Canal*" and was renamed the "*Draw Bridge Over Sacramento River at Grand Island*" when modified in 1914.

Circa 1925, the bridge was sold to the State of California and moved down river by barge to become the "*Three Mile Slough Bridge*", which was in Sacramento County in the vicinity of Walnut Grove, Sacramento County. The State of California made various improvements to the bridge in the mid 1920's (Drawings D-5 to D-9) and late 1930's (Drawings D-10 to D-25) to accommodate increased traffic flows generated by the extension of State Route 160 to Sherman Island over Three Mile Slough.

Technological History

The engineers and designers of the bridge are unknown. What is known is the process by which most bridges of the day evolved. In the mid to late 1800's, bridge steel bridge building was limited to short spans due to the use of cast iron. The quality of the steel used was often inconsistent and of poor quality [Palmer, 1974] [Hopkins, 1976].

Technological History, continued

The steel used throughout the Bacon Island Road Bridge is either "*Carnegie*" or "*Bethlehem*" as evidenced by markings on the steel members. The quality of these steel manufacturers is well documented by the industrial giants who learned their trade from the ground up [Palmer, 1974].

Andrew Carnegie (1835-1919), as a vice president of the Keystone Bridge Company, in 1870 convinced its president, J.H. Linville, to construct the Eads Bridge over the Mississippi River (Illinois and St. Louis Bridge, Captain James Buchanan Eads, Chief Engineer, construction period 1867 to 1874). This technological marvel was America's first significant continuous span steel through truss cantilever bridge with spans in excess of 400 feet [Palmer, 1976].

The Eads collaboration provided the industrious Carnegie with knowledge, wealth and the momentum to establish the Carnegie Steel Company. The intelligence he gained at Keystone Bridge Company are reflected in the Bacon Island Road Bridge swing span. Carnegie Steel Company was sold to J.P. Morgan in 1901 and became the new United States Steel Company. Charles Michael Schwab (1862 to 1939), president of Carnegie Steel (1897 to 1901), U.S. Steel (1901 to 1903) and owner-president of Bethlehem Steel Company (1903), is the thread that connects the steel used in the Bacon Island Road Bridge from Carnegie Steel Company to Bethlehem Steel Company. The majority of the steel used in the Bacon Island Road Bridge was manufactured prior to 1904 and reflects 19th century manufacturing technology assimilated by its manufacturers [Palmer, 1976] [Time, 1990].

The longevity, mobility and durability of the Bacon Island Road Bridge is a direct result of those 19th century processes, pioneered by the Keystone Bridge Company and the steel manufacture and bridge building processes fine tuned by Carnegie and Schwab.

It is hoped that a local district, organization or developer will be able to find a reuse for the oldest swing span bridge in California. The new Bacon Island Road Bridge will be operational August 1995. Dismantling of the old Bacon Island Road Bridge must be completed within sixty days of Board of Supervisors acceptance of the replacement bridge over Old River to comply with U.S. Coast Guard Regulations.

IV. SOURCES

Bibliography

Anonymous. "*History of Bacon Island*" from Haggin Museum Archives, Stockton, California, no date.

Beasom, Paul. "*Interview of May 5, 1995*", Bacon Island Road Bridge, Open House.

Hopkins, H.J. "*A Span of Bridges*", 1976.

Jones & Stokes Associates. "*Environmental Assessment/Initial Study & Programmatic Section 4(f) Evaluation*", Bacon Island Road Bridge No. 1510, March 1991.

Palmer, H. "*Bridges - The Spans of North America*", [Steel, 1874-c. 1900 & Steel, 1900-c.1930], 1974.

Pannell, J.P. "*An Illustrated History of Civil Engineering*", 1964.

San Joaquin County (SJC). Department of Public Works', Central Files (**C**), Surveyor Files (S), Vault (**V**) and Reference Library Resources (**R**):

Bacon Island Road. "*Bacon Island Road #624 File*", (S) c.1940.
Bridges. "*Bacon Island Road Bridge #1510 File*", © c.1948.
"*Bridge Operation Instruction Sheet*" © c. 1992.
Cassano, Robert. "*Letter to Federal Highway Administration Detailing Costs and Alternatives*", Imbsen & Associates Consulting Engineers to San Joaquin County, (R) November 12, 1990.
Dills, Richard. "*Supplementary Bridge Report*", (R) September 15, 1992.
Downing, Dale. "*Letter from State Highway Engineer*", (R) July 2, 1969.
Kalia, Ram. "*Supplementary Bridge Report*", (R) c.1991.
Lau, Francis. "*Bridge Inspection Report*", (R) c.1989.
McGuire, K.P. "*Bridge Report*", (R) c.1968;
"*Supplementary Bridge Report*", (R) c.1969.
Morehead, W.E. "*Supplementary Bridge Report*", c.1990;
"*Biennial Bridge Report*", (R) September 17, 1992.
O'Halloran, Pat. "*Letter from Bissel & Karn, Inc.*", (R) September 11, 1985.
Reynaga,Robert. "*Biennial Supplementary Bridge Report*", (**R**) December 2, 1988.
Saqqa, Mahmoud. "*Bridge Inspection Report*", (R) May 9, 1990;
"*Bridge Inspection Report*", (R) September 9, 1993;
"*Bridge Inspection Report*", (R) January 12, 1994.

Time Inc. "*TIME Magazine Compact Almanac*", Eads, Carnegie & Schwab, c.1990.

Werner, Roger. "*An Archaeological Survey...Bacon Island Bridge...*", May 3, 1988.

IV. SOURCES, continued

Drawings

1909 Engineer-unknown, labeled (Drawer No. 8, Section A Folder No. 5) titled "*Some Details of the Draw Bridge at Grand Canal*" Sacramento, California, July 1909, C.M. Phinney, County Surveyor.

1914 Engineer-unknown, labeled (SHEET 1, 1 Case 1 Draw 2, Sec. 2. 34x22), titled "*Revised Plan Showing ADDITIONAL PROTECTION*" with reference to the Sacramento County Board of Supervisors Minutes, in green ink "Original Design 1904, Constructed 1906"; revisions to black ink drawing, in red ink, dated and initialed, "Apr- 1914 J.W.H."; and noted in pencil, "X-Sac-11-C, Three Mile Slough, Br. #24-50, E-24", Sacramento, California, Apr 1914, Frank C. Miller, County Surveyor.

Engineer-unknown, labeled (1-1 Case 1 Draw 2, Sec. 2. 34x22) titled "Draw Bridge Over Sacramento River at Grand Island", Sacramento County, California, J.C. Boyd, County Surveyor.

Engineer-unknown, labeled (1-2 Case 1 Draw 2, Sec. 2. 34x22) titled "Draw Bridge Over Sacramento River at Grand Island", Sacramento County, California, J.C. Boyd, County Surveyor.

1925 C.W. Deterding, Jr. County Engineer, labeled (Detail of Turning Mechanism, Pinion Support, Cast Iron, C-I) titled "*THREE MILE SLOUGH BRIDGE*", noted in pencil "X-Sac-11-C Br. #24-50", Sacramento, California, July 1925, first sheet un-numbered.

1925 C.W. Deterding, Jr. County Engineer, labeled (Detail of Turning Mechanism, Bearing Bracket, Cast Iron) titled "*THREE MILE SLOUGH BRIDGE*", noted in pencil "X-Sac-11-C Br. #24-50", Sacramento, California, July 1925, second sheet un-numbered.

C.W. Deterding, Jr. County Engineer, labeled (Detail of Turning Mechanism, Upper Support - Cast Iron) titled "*THREE MILE SLOUGH BRIDGE*", noted in pencil "X-Sac-11-C Br. #24-50", Sacramento, California, July 1925, third sheet un-numbered.

C.W. Deterding, Jr. County Engineer, labeled (ASSEMBLY DIAGRAM) titled "*THREE MILE SLOUGH BRIDGE*", noted in pencil "X-Sac-11-C Br. #24-50", Sacramento, California, July 1925, fourth sheet un-numbered.

1937 State of California, Division of Highways, Bridge Department, labeled (Electrical General Plan, Sheets 1 to 3) titled "*Bridge Across Three Mile Slough*", Sacramento, California, May 17, 1937.

1939 State of California, Division of Highways, Bridge Department, labeled (Detail of Horizontal Ties, Center Holdown Details, Brake and Hand Gear Train, Bearing Supports - Shaft No. 5, Bearing Support - Shaft No. 6, Bearing Details - Shaft No. 6, Platform and Bearing Detail, Sheets 1 to 8) titled "*Repairs to Bridge Across 3 Mile Slough*", Sacramento, California, September 1, 1939.

IV. SOURCES, continued

Drawings, continued

1943 State of California, Division of Highways, Bridge Department, Resident Engineer, labeled ("AS-BUILT" GENERAL PLAN, ROADWAY SECTIONS, ROADWAY SECTIONS, DETAILS, Sheets 1 to 4) titled "*Redecking Three Mile Slough*", Sacramento, California, November 11, 1943.

1949 San Joaquin County, J.B. Manthey, County Surveyor, labeled (PLAN AND PROFILE, CENTER PIER & DRAW REST DETAILS, Sheets 1 to 2) titled "*MIDDLE RIVER BRIDGE NO. 1510 AT BACON ISLAND*", San Joaquin County, California, September 17, 1949.

1949 San Joaquin County, J.B. Manthey, County Surveyor, labeled (REVISED CENTER PIER DETAILS) titled "*MIDDLE RIVER BRIDGE NO. 1510 AT BACON ISLAND*", San Joaquin County, California, November 2, 1949.

1950 San Joaquin County, J.B. Manthey, County Surveyor, labeled (PLAN & PROFILE, TIMBER TRESTLE DETAILS, REST PIER 8 ABUTMENT DETAILS, Sheets 1 to 3) titled "*MIDDLE RIVER BRIDGE NO. 1510 AT BACON ISLAND*", San Joaquin County, Califomia, August 17, 1950.

1950 W.N. Samarzich & Associates, Consulting Civil Engineers for San Joaquin County, J.B. Manthey, County Surveyor, labeled (PLAN & PROFILE, TIMBER TRESTLE DETAILS, REST PIER 8 ABUTMENT DETAILS, Sheets 1 to 3) titled "*MIDDLE RIVER BRIDGE NO. 1510 AT BACON ISLAND*", San Joaquin County, California, August 17, 1950.

V. PROJECT INFORMATION

This document has been completed as a requirement of the Federal Highway Administration (FHWA) and National Parks Service mandate to preserve the unique features of Bacon Island Road Bridge, the oldest swing span bridge in California, for the Historic American Engineering Record.

The San Joaquin County Department of Public Works was the project manager for the recordation. The photographer was Steve Pereira of Pereira Photography, Stockton, California. Contributing to the archival research for this HAER documentation were the County of Sacramento, Department of Public Works; the Haggin Museum of Stockton, California; the State of California, Department of Transportation, Sacramento Headquarters, Sacramento, California and District 10 offices in Stockton, California; San Joaquin County Public Library, Reference Desk, Stockton, California; San Joaquin County Department of Public Works; and Bill Wilkinson, Retired Bridge Tender and Ferry Operator for San Joaquin County Department of Public Works.

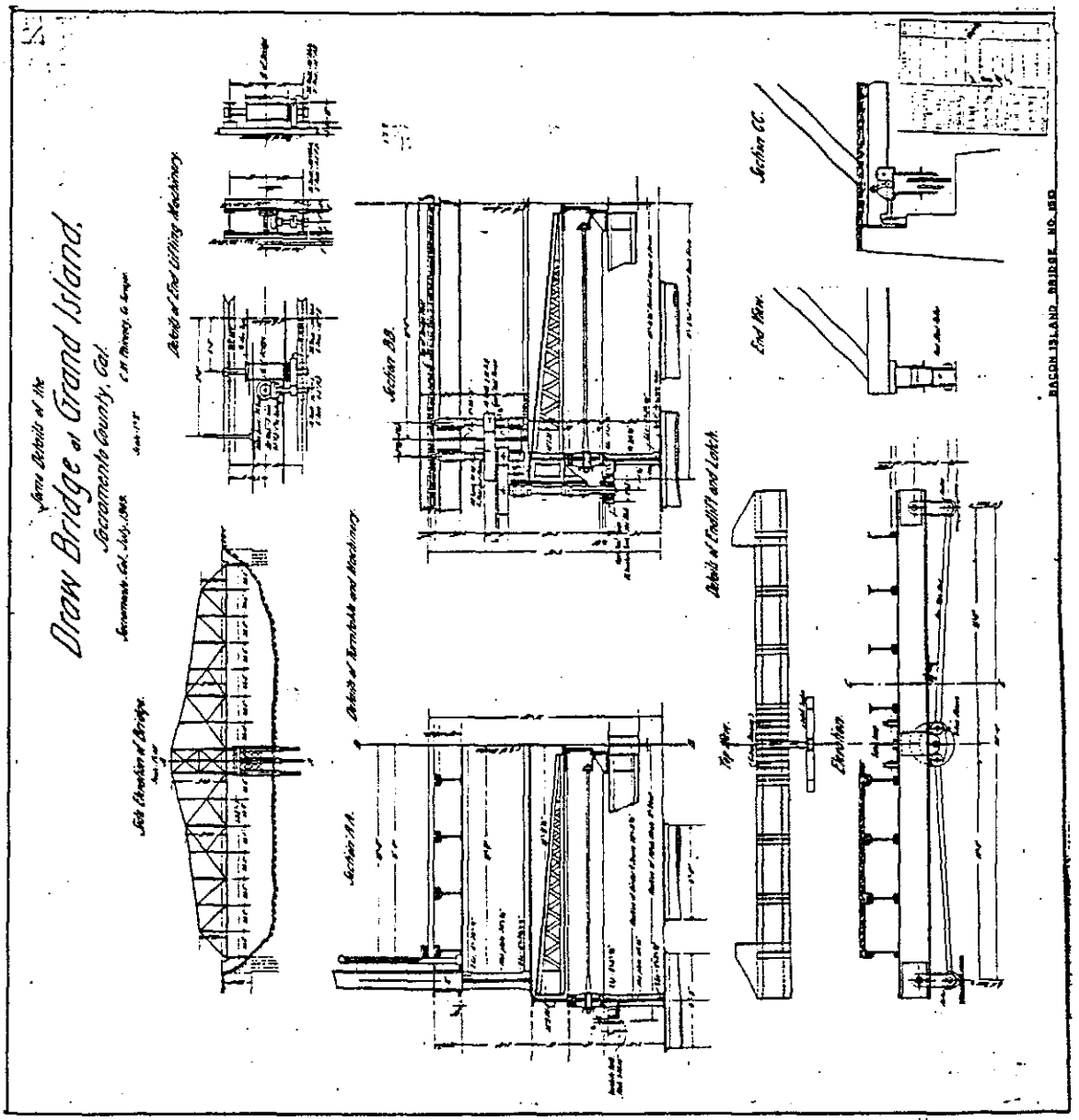
Additional information may be reviewed at the Department of Public Works offices by researching Bridge Files for the Surveyor, Engineering, Central Files Divisions and Vault space.

APPENDIX "A"

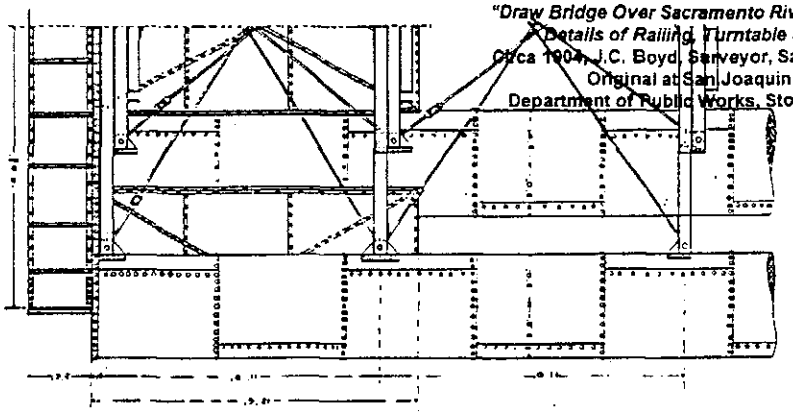
HISTORIC AMERICAN ENGINEERING RECORD INDEX TO DRAWINGS
(Original Drawings Located in Department of Public Works' Bridge Files)

BACON ISLAND ROAD BRIDGE (Bridge No. 29C-108) spanning the Middle River at Bacon Island Road, between Bacon Island and Lower Jones Tract Stockton Vicinity, San Joaquin County, California

"Some Details of the Draw Bridge at Grand Island, Details of Turntable and Machinery, Side Elevation"
Circa 1904, J.C. Boyd, Surveyor, Sacramento County
Original at San Joaquin County
Department of Public Works, Stockton, California



"Draw Bridge Over Sacramento River at Grand Island, Details of Railing, Turntable & Pivot Pier"
Circa 1904, J.C. Boyd, Surveyor, Sacramento County,
Original at San Joaquin County
Department of Public Works, Stockton, California



DETAILS OF PIVOT PIER

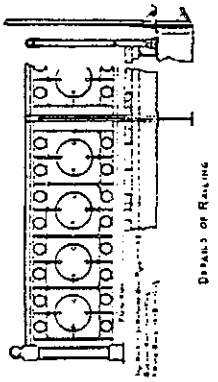
DRAW BRIDGE OVER SACRAMENTO RIVER AT GRAND ISLAND SACRAMENTO COUNTY, CAL.

J. C. BOYD, COUNTY SURVEYOR.

BOARD OF SUPERVISORS
E. A. MEISTER — MORRIS BROOKS
WM. MCLAUGHLIN — GILLIS DUFFY
W. J. DOLKEN CHAIRMAN

X-Sac-11-C Three M. Sheet 4

STATE NO. 29C-108



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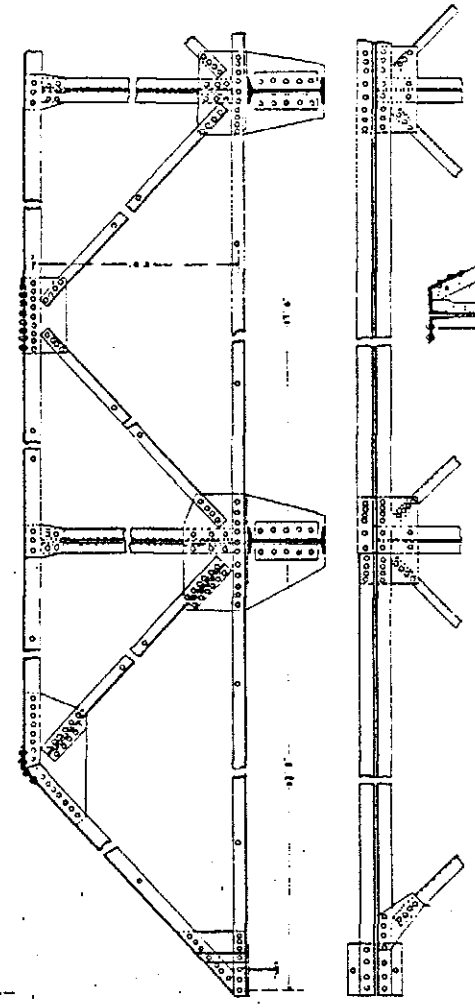
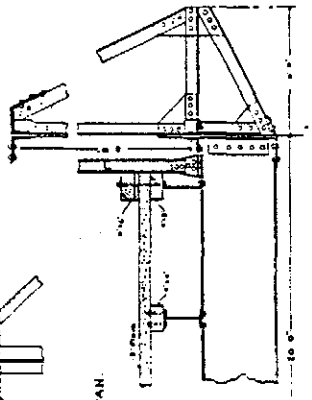
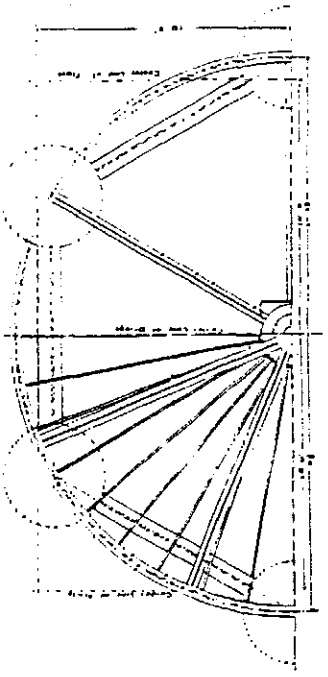


DETAILS OF 70 FT. SPAN





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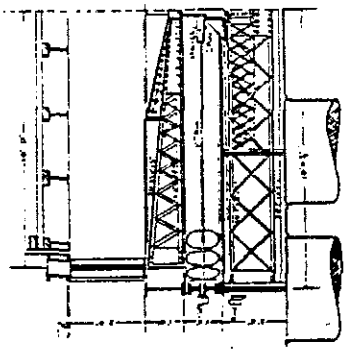
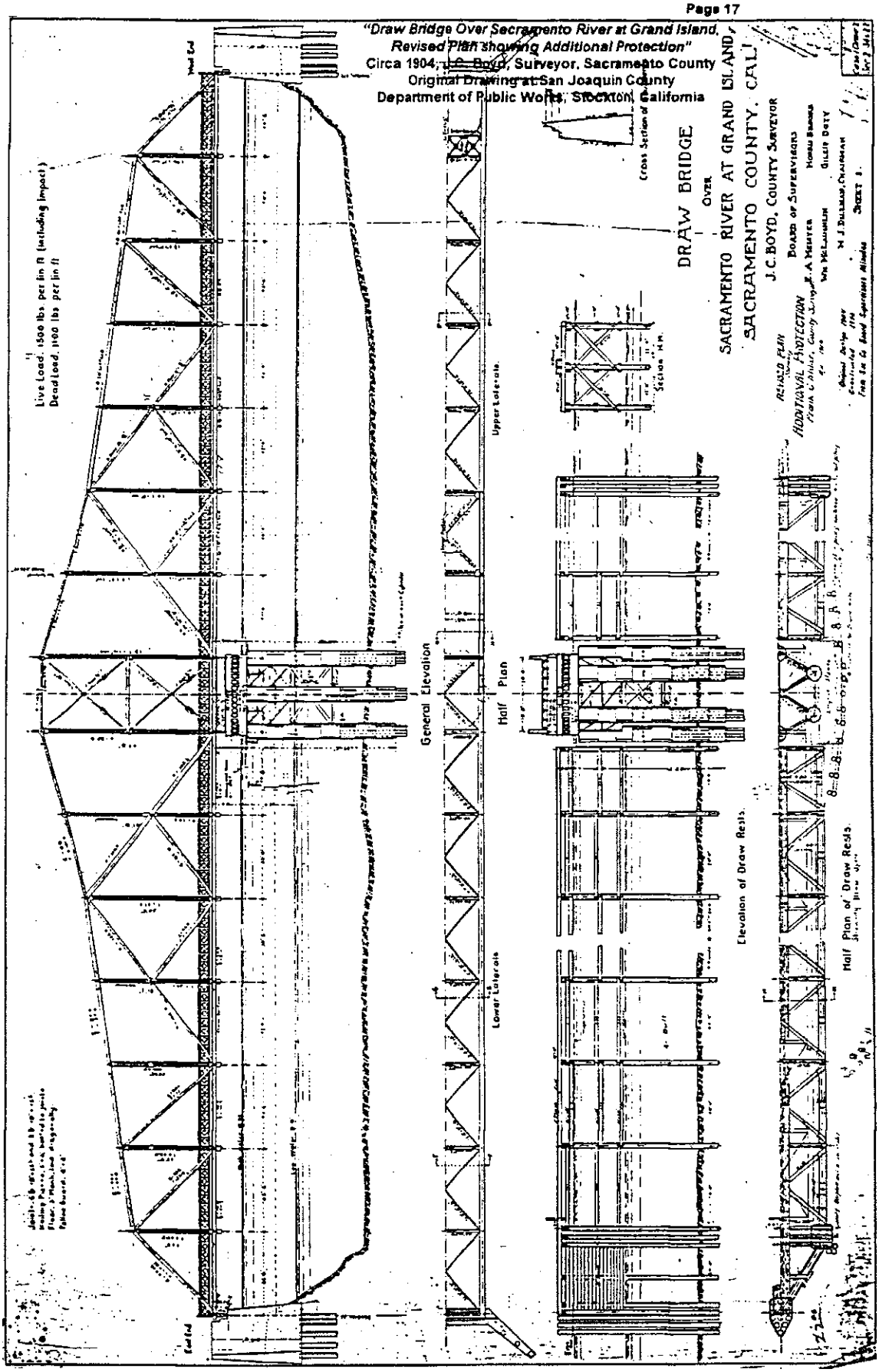
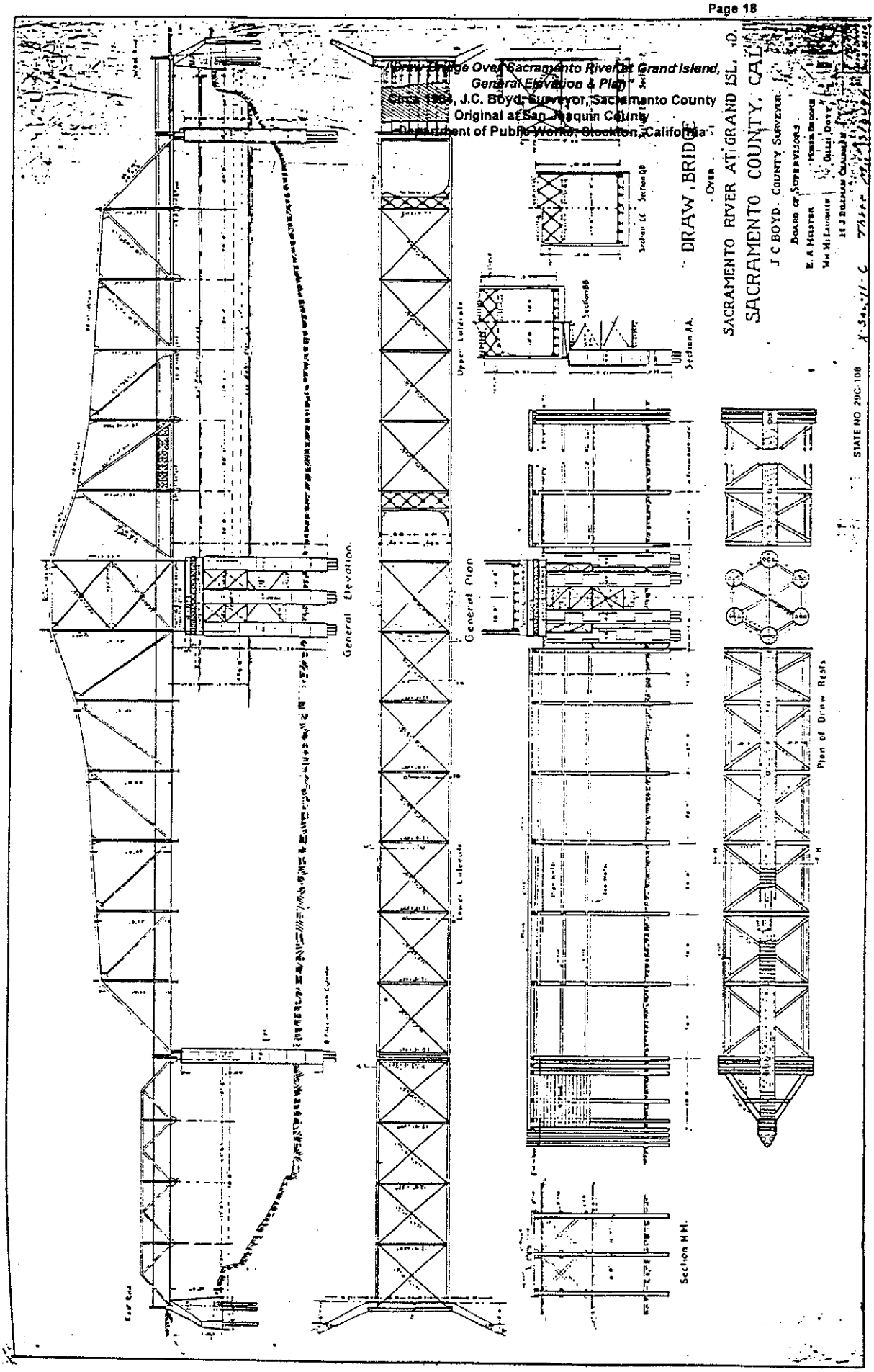
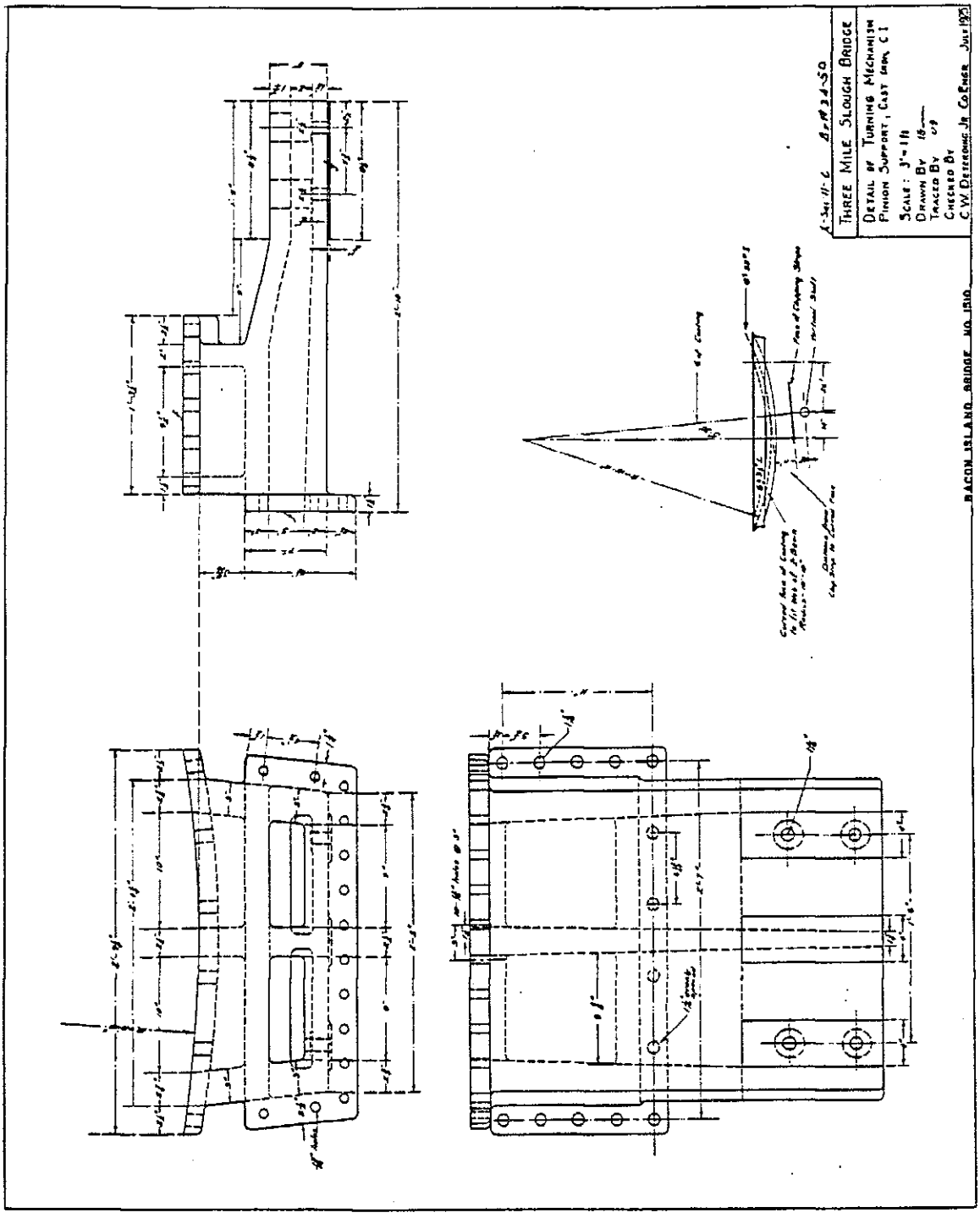




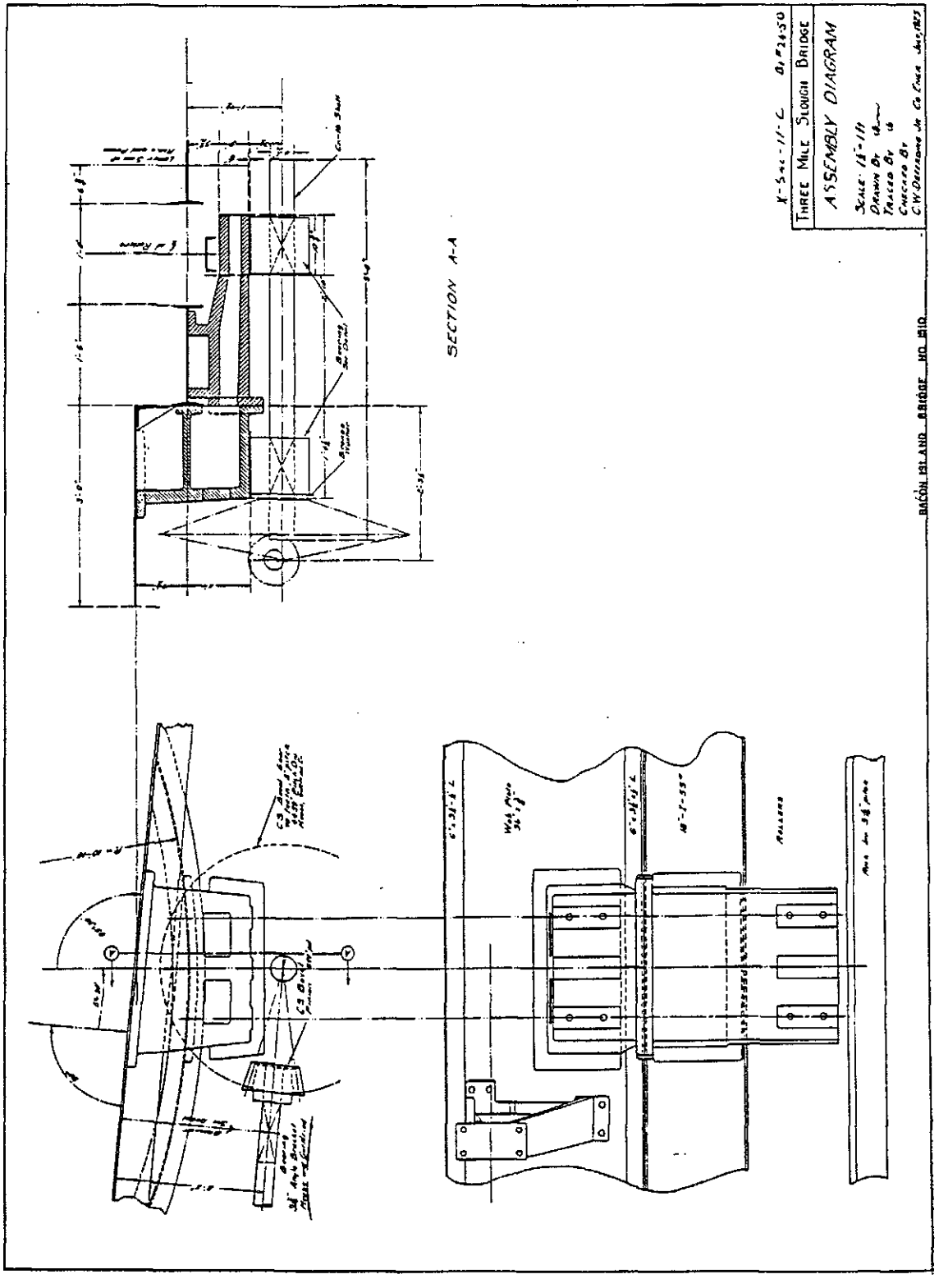
"Draw Bridge Over Sacramento River at Grand Island, Revised Plan showing Additional Protection"
Circa 1904, J. C. Boyd, Surveyor, Sacramento County
Original Drawing at San Joaquin County
Department of Public Works, Stockton, California


"Draw Bridge Over Sacramento River at Grand Island,
General Elevation & Plan"
Circa 1909, J.C. Boyd, Surveyor, Sacramento County
Original at San Joaquin County
Department of Public Works, Stockton, California
DRAW BRIDGE
OVER
SACRAMENTO RIVER AT GRAND ISL. N.D.
SACRAMENTO COUNTY, CAL.
J C BOYD. COUNTY SURVEYOR.
BOARD OF SUPERVISORS
STATE NO 29C-108
General Elevation
General Plan
Plan of Draw Rests
Section HH.
Section AA.

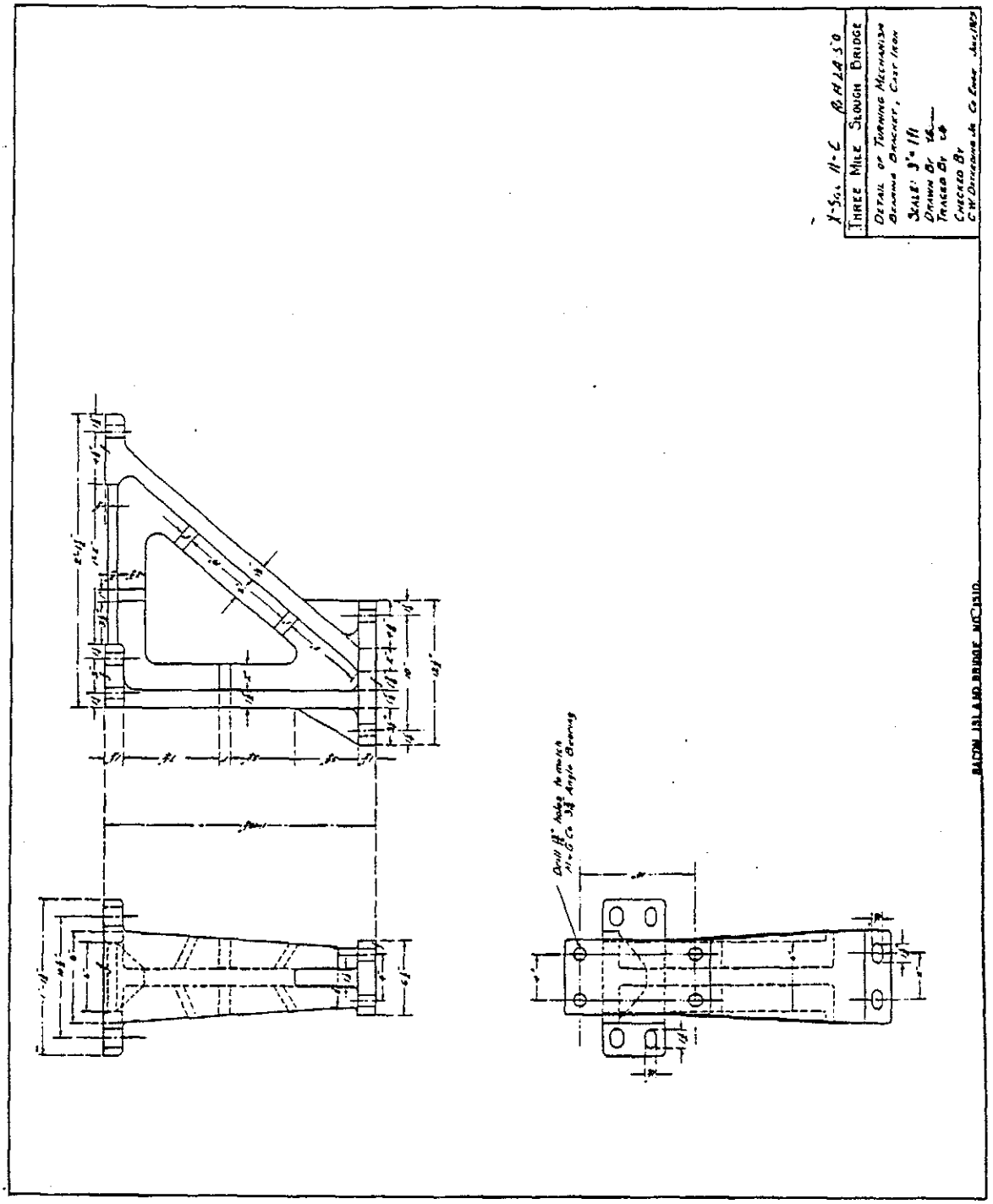
"Three Mile Slough Bridge, Detail of Turning Mechanism, Pinion Support, Cast Iron"
July 1925, C.W. Deterding Jr. County Engineer
Sacramento County, Original at San Joaquin County Department of Public Works, Stockton, California



"Three Mile Slough Bridge, Assembly Diagram"
July 1925, C.W. Deterding Jr. County Engineer
Sacramento County, Original at San Joaquin County
Department of Public Works, Stockton, California



"Three Mile Slough Bridge, Detail of Turning Mechanism"
July 1925, C.W. Deterding Jr. County Engineer
Sacramento County, Original at San Joaquin County
Department of Public Works, Stockton, California

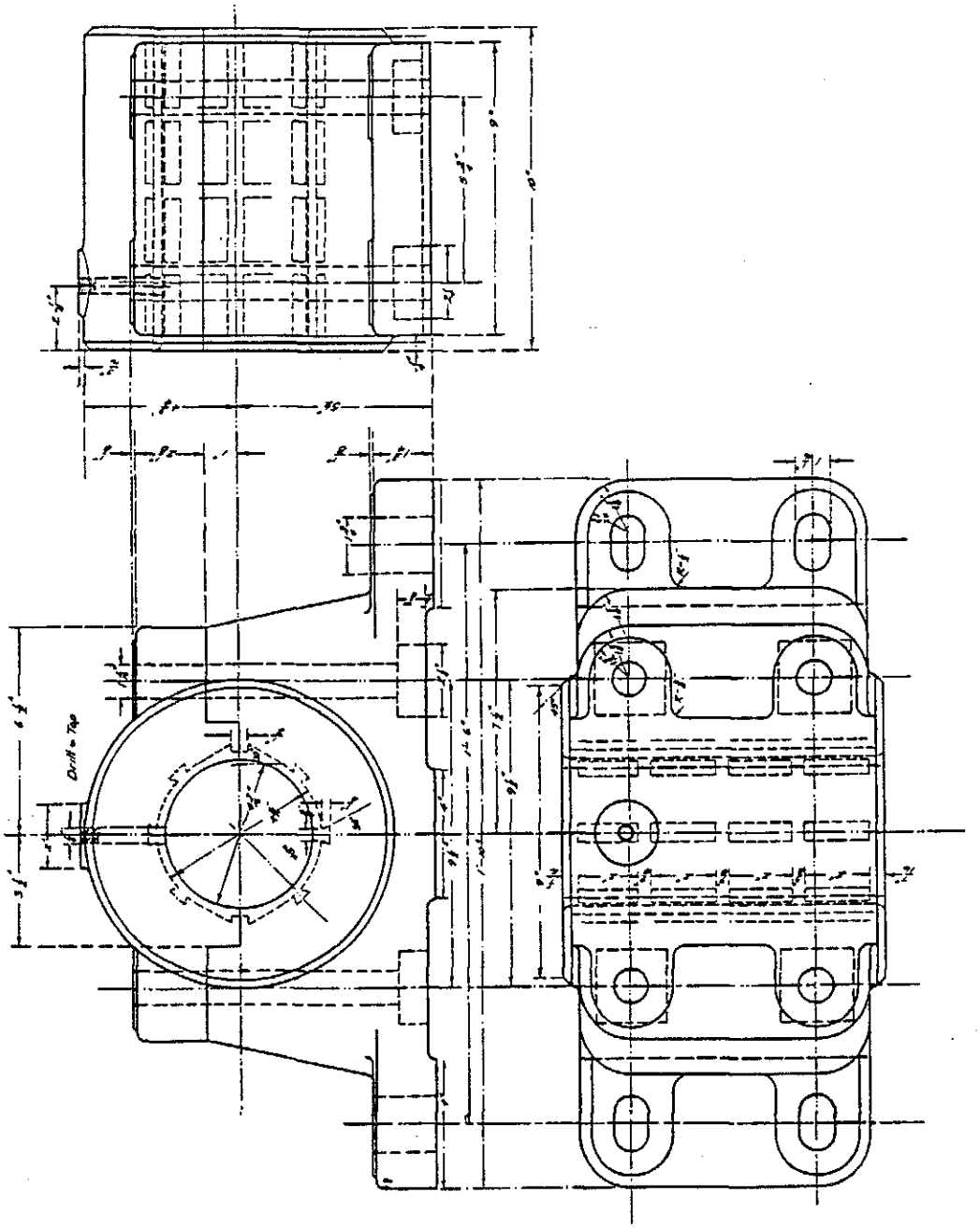


"Three Mile Slough Bridge, Pinion Shaft Bearing"
July 1925, C.W. Deterding Jr. County Engineer
Sacramento County, Original at San Joaquin County
Department of Public Works, Stockton, California

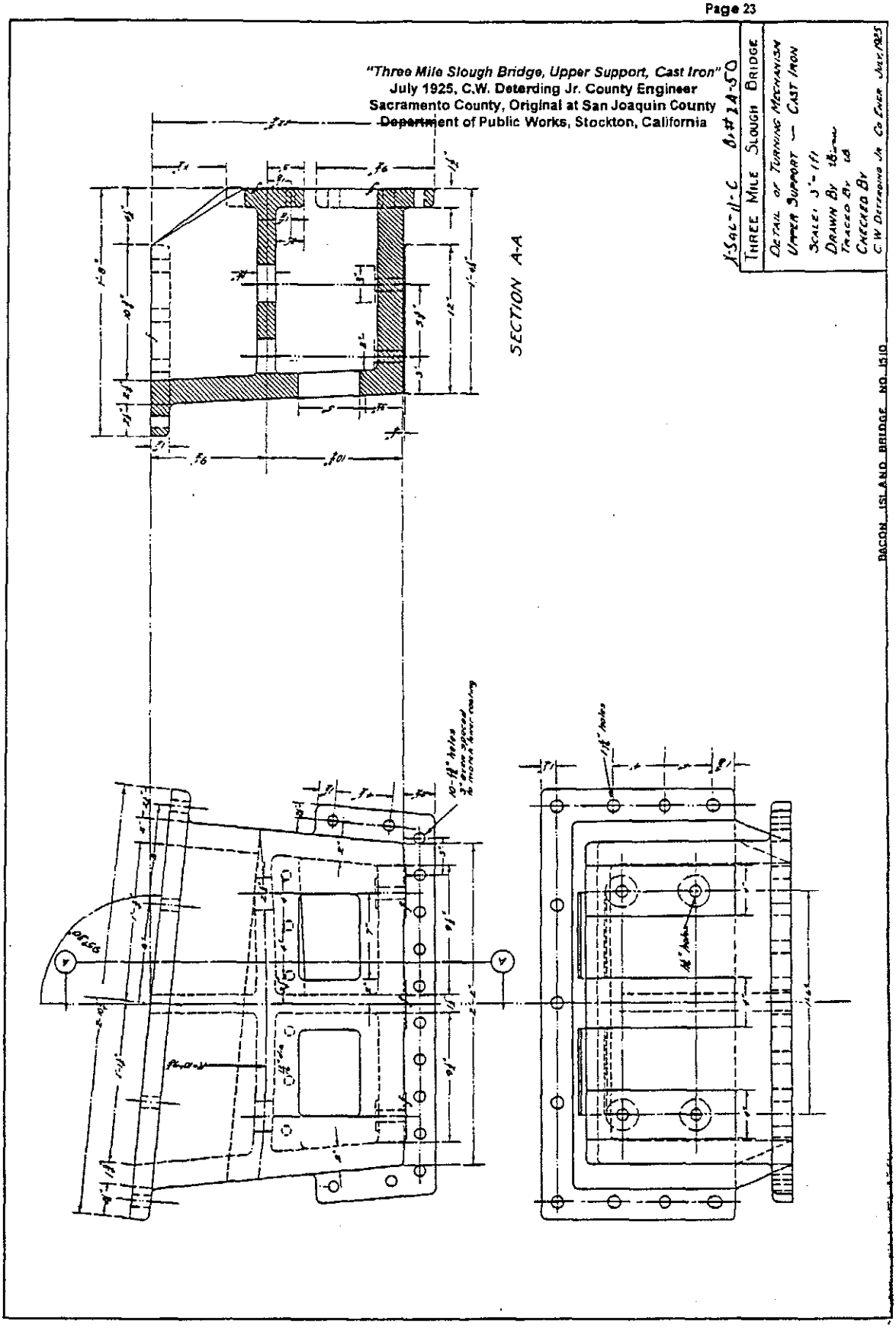
X Scan 11-6
Brit 14-5

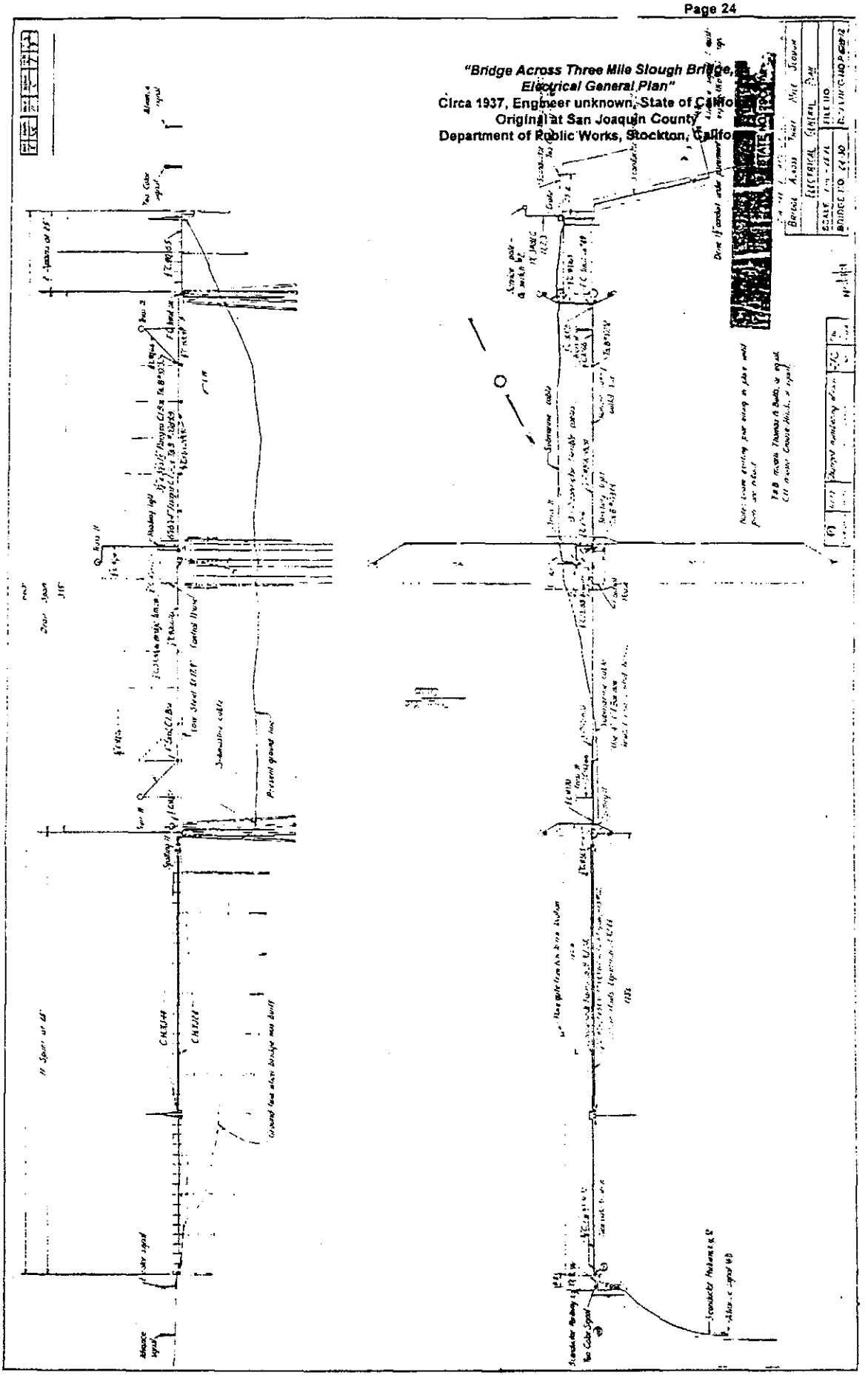
THREE MILE SLOUGH BRIDGE
DETAIL OF TURNING MECHANISM
PINION SHAFT BEARING, C I
SCALE: 6" - 1 ft
DRAWN BY
TRACED BY
CHECKED BY
C W DETERDING JR CO ENGR. JULY 1925

BACON ISLAND BRIDGE NO. 1510

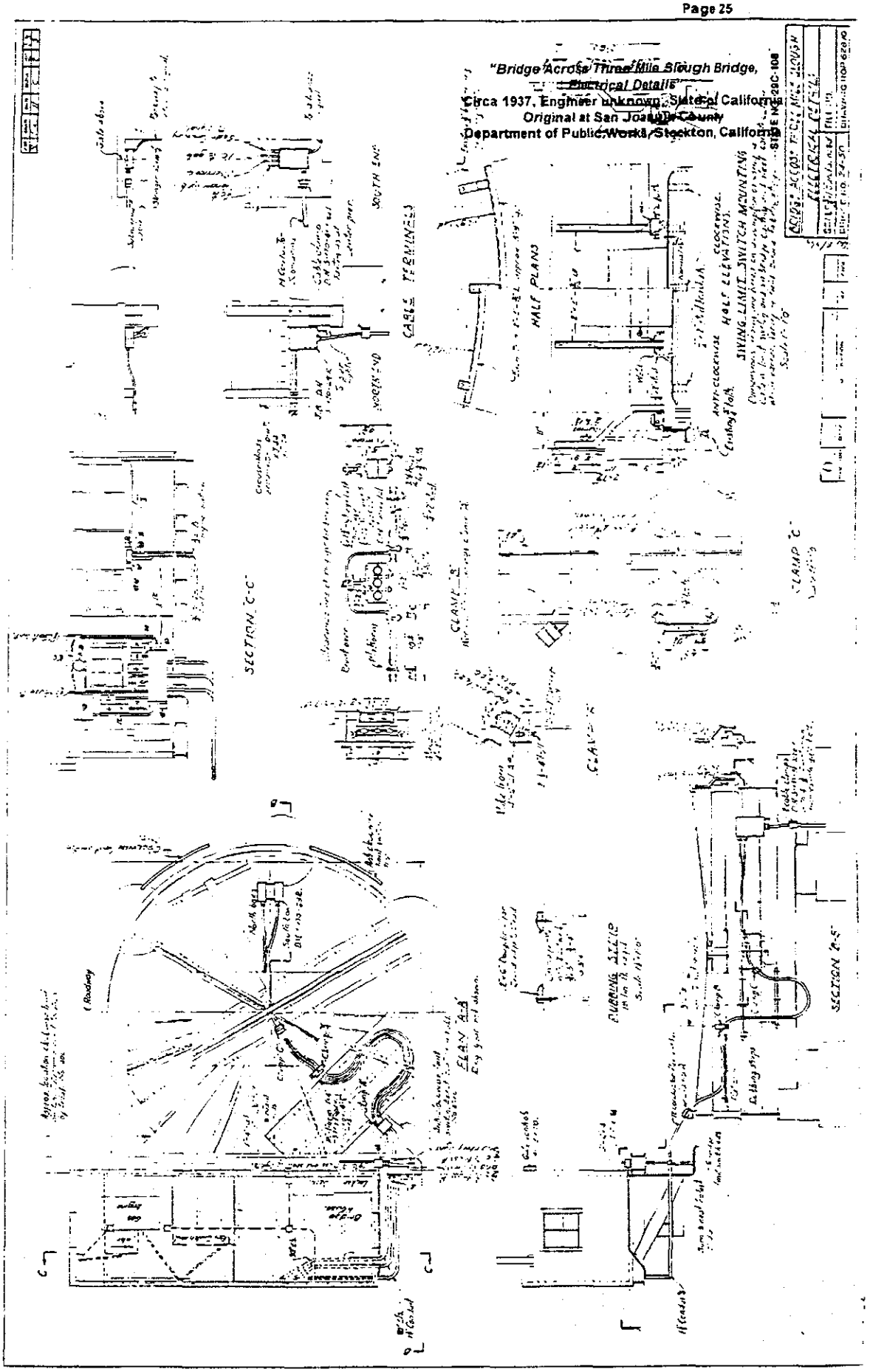


"Three Mile Slough Bridge, Upper Support, Cast Iron"
July 1925, C.W. Deterding Jr. County Engineer
Sacramento County, Original at San Joaquin County
Department of Public Works, Stockton, California

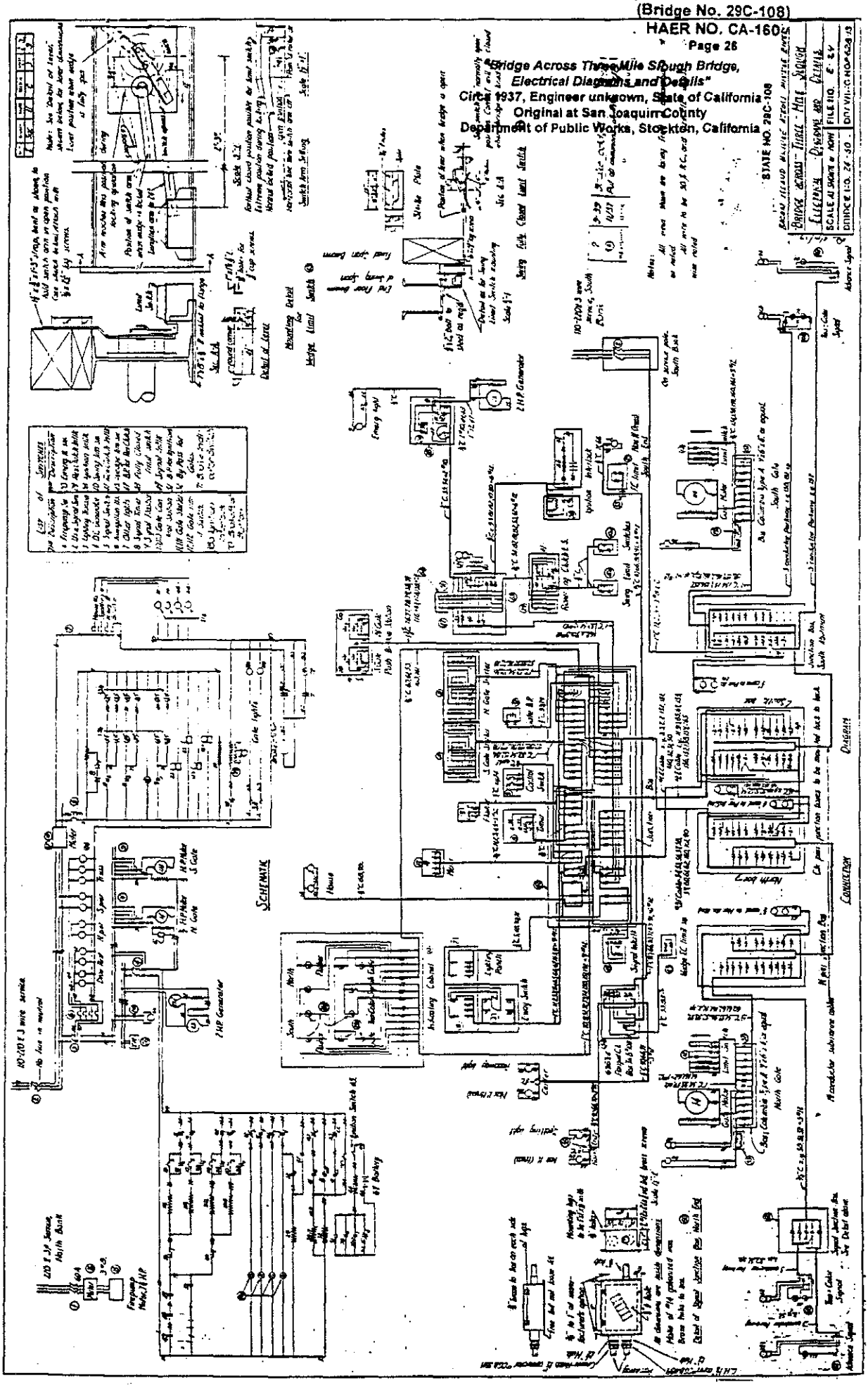




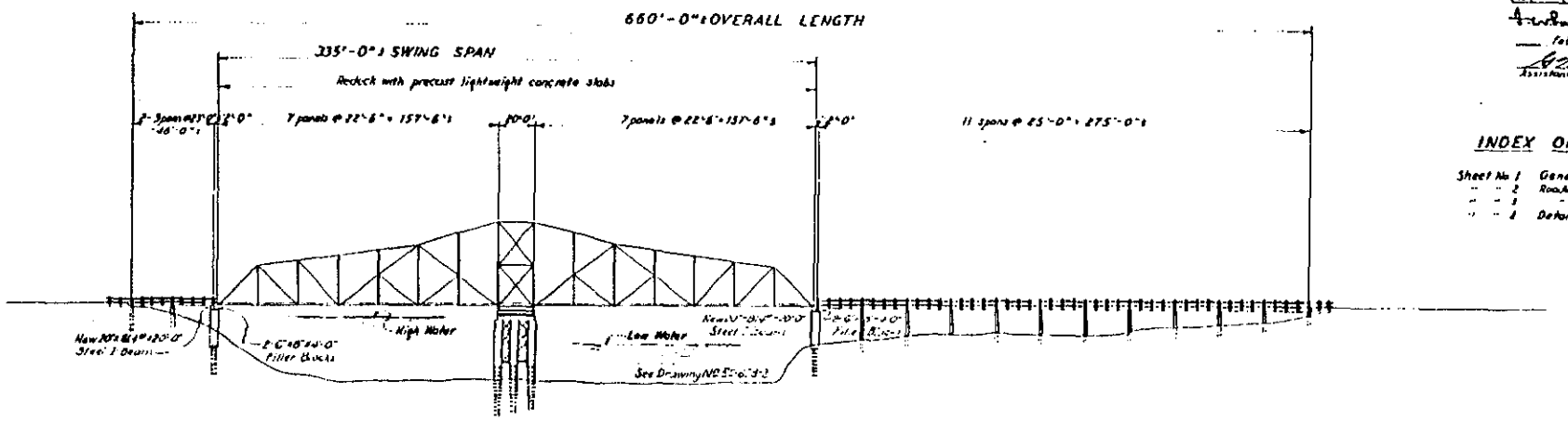
"Bridge Across Three Mile Slough Bridge, Electrical General Plan"
Circa 1937, Engineer unknown, State of Califo
Original at San Joaquin County
Department of Public Works, Stockton, Califo



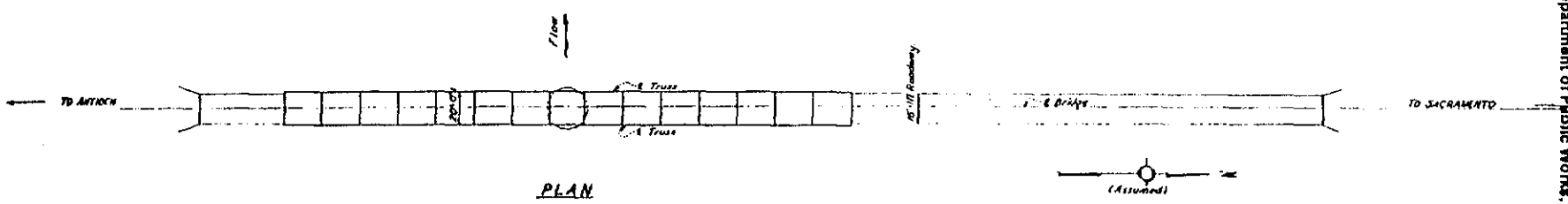
"Bridge Across Three Mile Slough Bridge, Electrical Details"
Circa 1937, Engineer unknown, Sate of California
Original at San Joaquin County
Department of Public Works, Stockton, California



"Bridge Across Three Mile Slough Bridge, Electrical Diagrams and Details"
Circa 1937, Engineer unknown, State of California
Original at San Joaquin County
Department of Public Works, Stockton, California



ELEVATION



PLAN

INDEX OF PLANS

Sheet No 1		General Plan.
" " 2		Roadway Sections.
" " 3		" "
" " 4		Details.

February 16, 1938

Assistant State Highway Engr.

Note: This set of plans has been corrected to correspond to the "AS BUILT" prints submitted by the Resident Engineer, Dated Oct 11, 1938. Tracings corrected by A.D.D., 11-2-43.

For "GENERAL NOTES" see Sheet No 3.

STATE NO. 29C-108
BACON ISLAND BRIDGE NO. 1510

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF HIGHWAYS

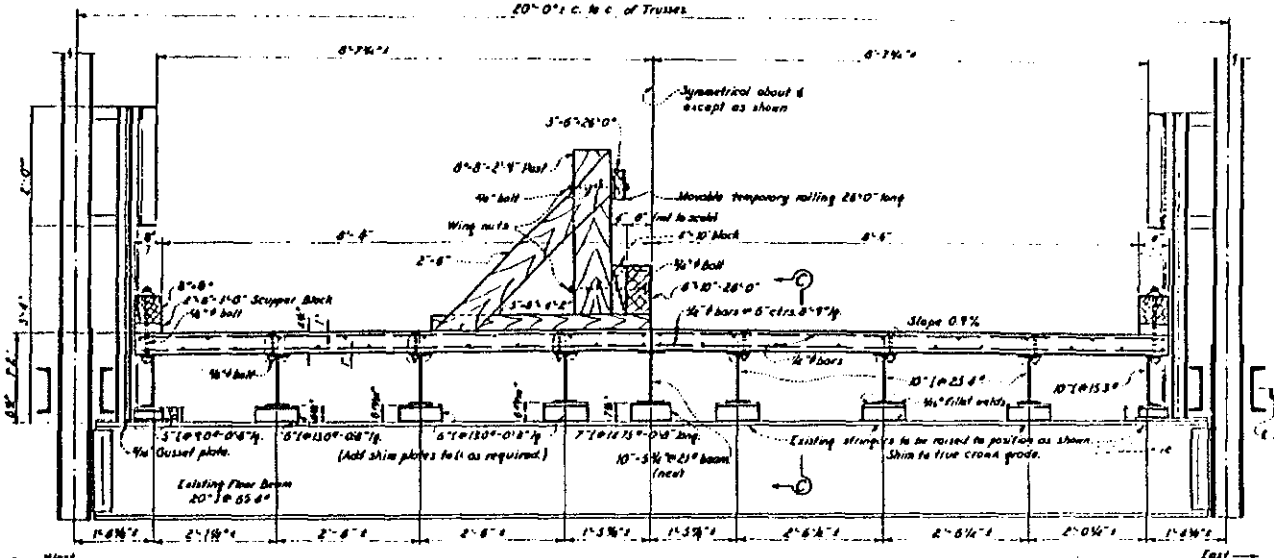
REDECKING
~~BRIDGE AND APPROACHES~~
14 MI NORTH OF CONTRA COSTA COUNTY LINE
IN SACRAMENTO COUNTY

GENERAL PLAN

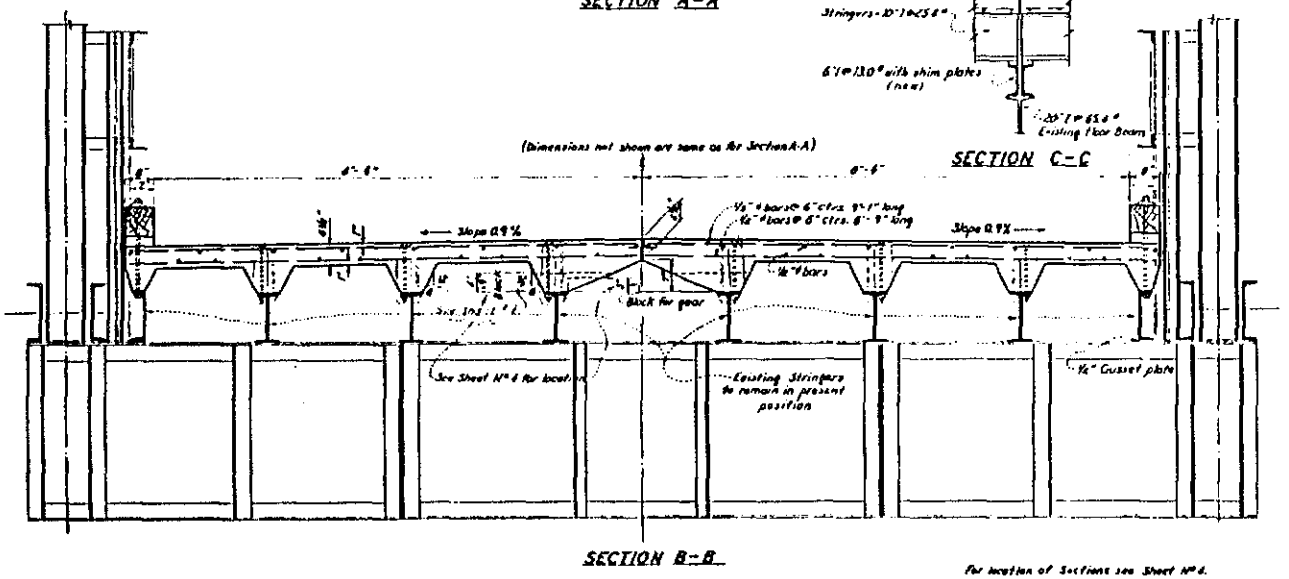
SCALE 1" = 30'-0" | FILE NO
BRIDGE NO 24-50 | DRAWING NO C-678-1

"Redecking, General Plan"
Circa 1937, Engineer unknown, State of California,
Division of Highways, Original at San Joaquin County
Department of Public Works, Stockton, California

BACON ISLAND ROAD BRIDGE
(Bridge No. 29C-108)
HAER NO. CA-160
Page 27



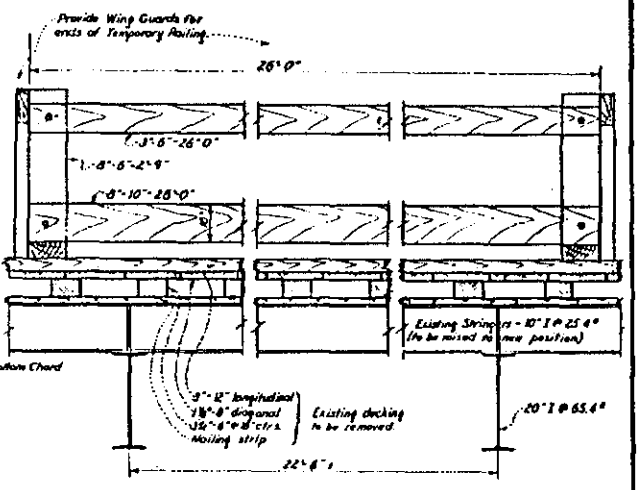
SECTION A-A



SECTION C-C

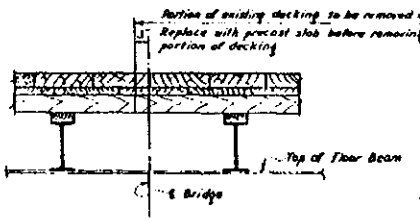
SECTION B-B

For location of Sections see Sheet N° 4.



The existing decking is to be removed and replaced with precast concrete slabs in units of one panel length for width of roadway.

TEMPORARY RAILING



METHOD OF DECK REMOVAL

"Three Mile Slough Bridge, Roadway Sections Method of Deck Removal" February 1938, Engineer unknown, State of California Division of Highways, Original at San Joaquin County Department of Public Works, Stockton, California

AS BUILT

CORRECTIONS

DATE

REDECKING
THREE MILE SLOUGH BRIDGE
ROADWAY SECTIONS

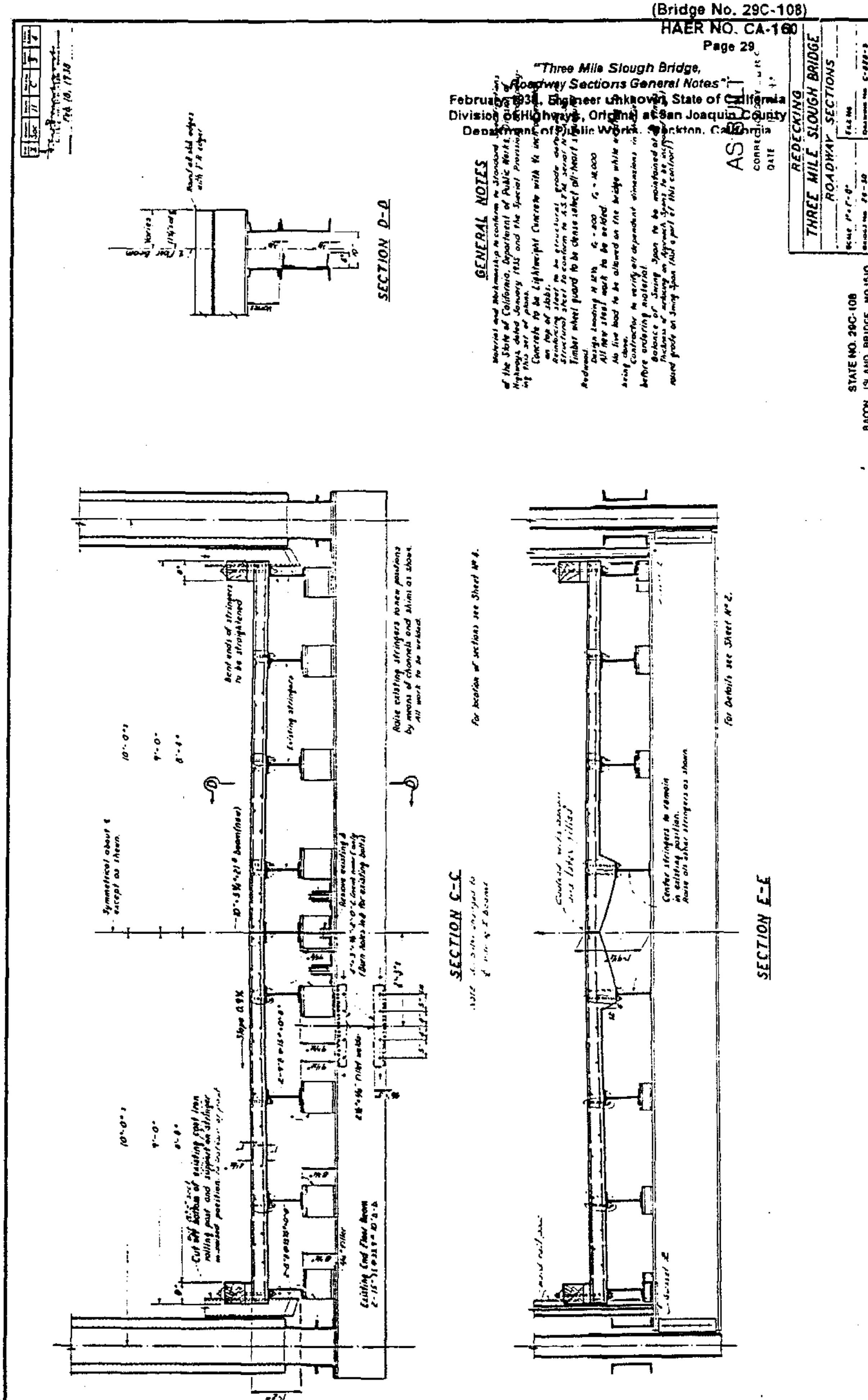
Scale 1"=1'-0" | Drawing No. C-678-B

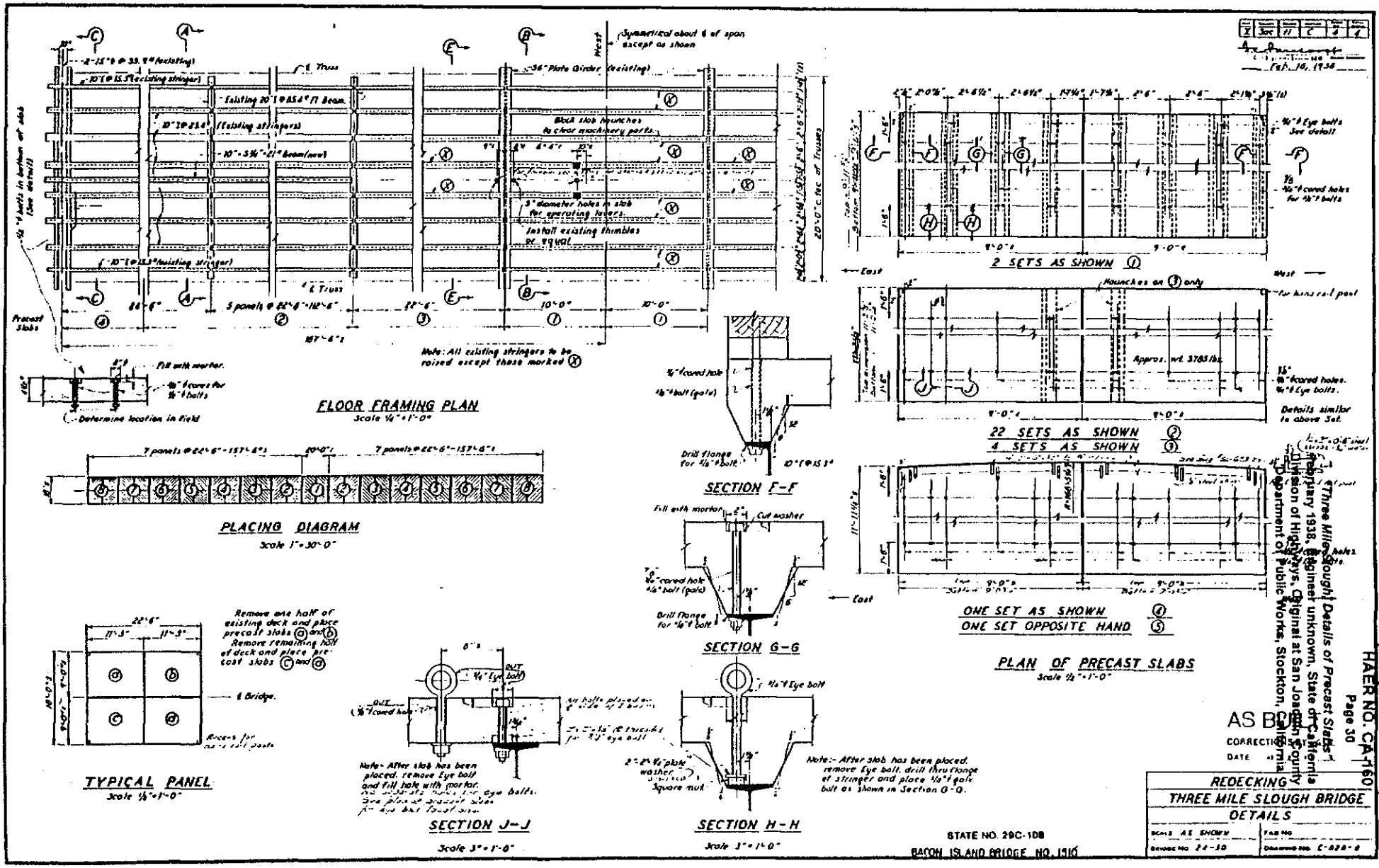
Bridge No. 24-10

STATE NO. 29C-108
BACON ISLAND BRIDGE NO. 240

BACON ISLAND ROAD BRIDGE
(Bridge No. 29C-108)
HAER NO. CA-160
Page 28

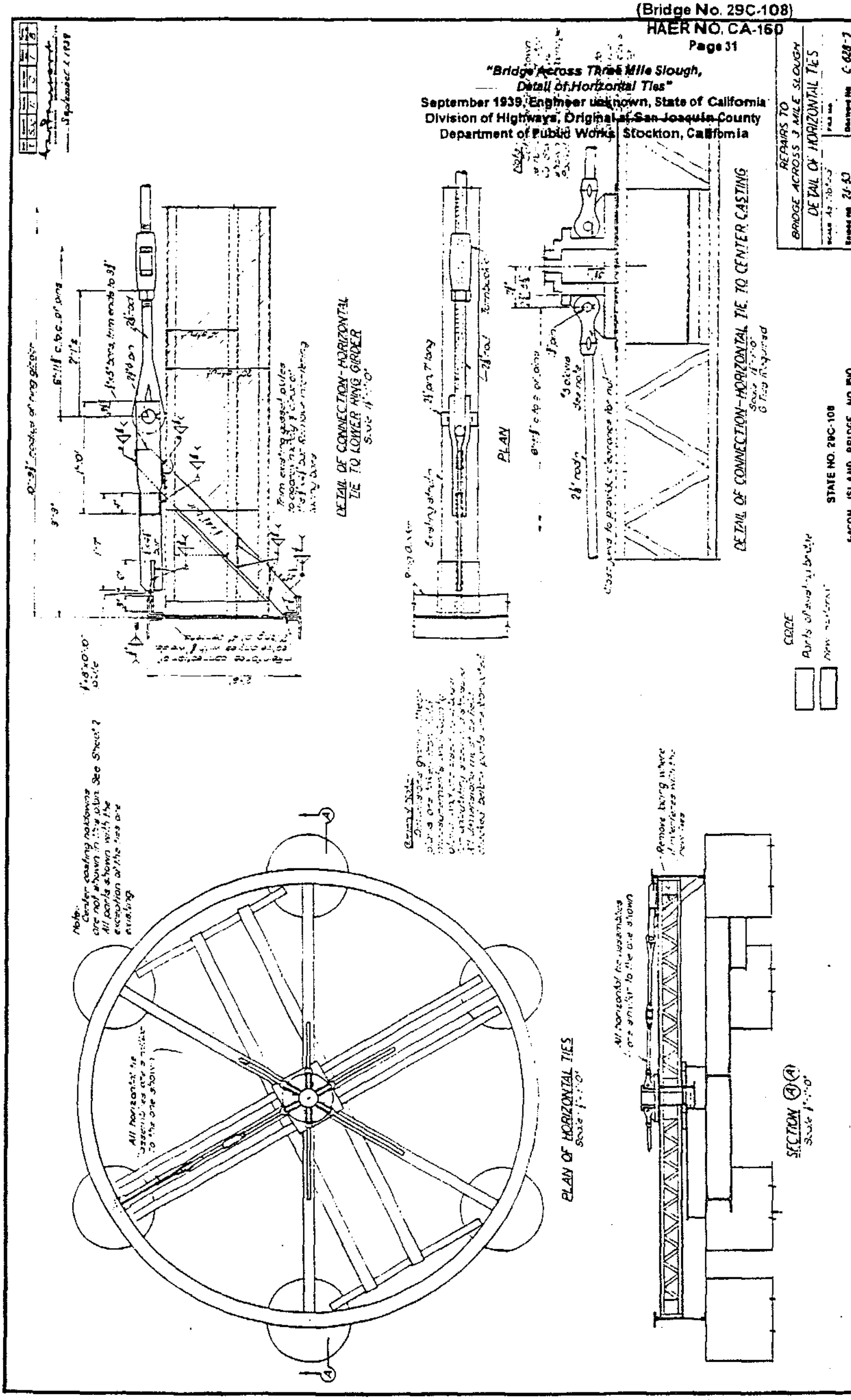
"Three Mile Slough Bridge, Roadway Sections General Notes", February 1938, Engineer unknown, State of California Division of Highways, Original at San Joaquin County Department of Public Works, Stockton, California

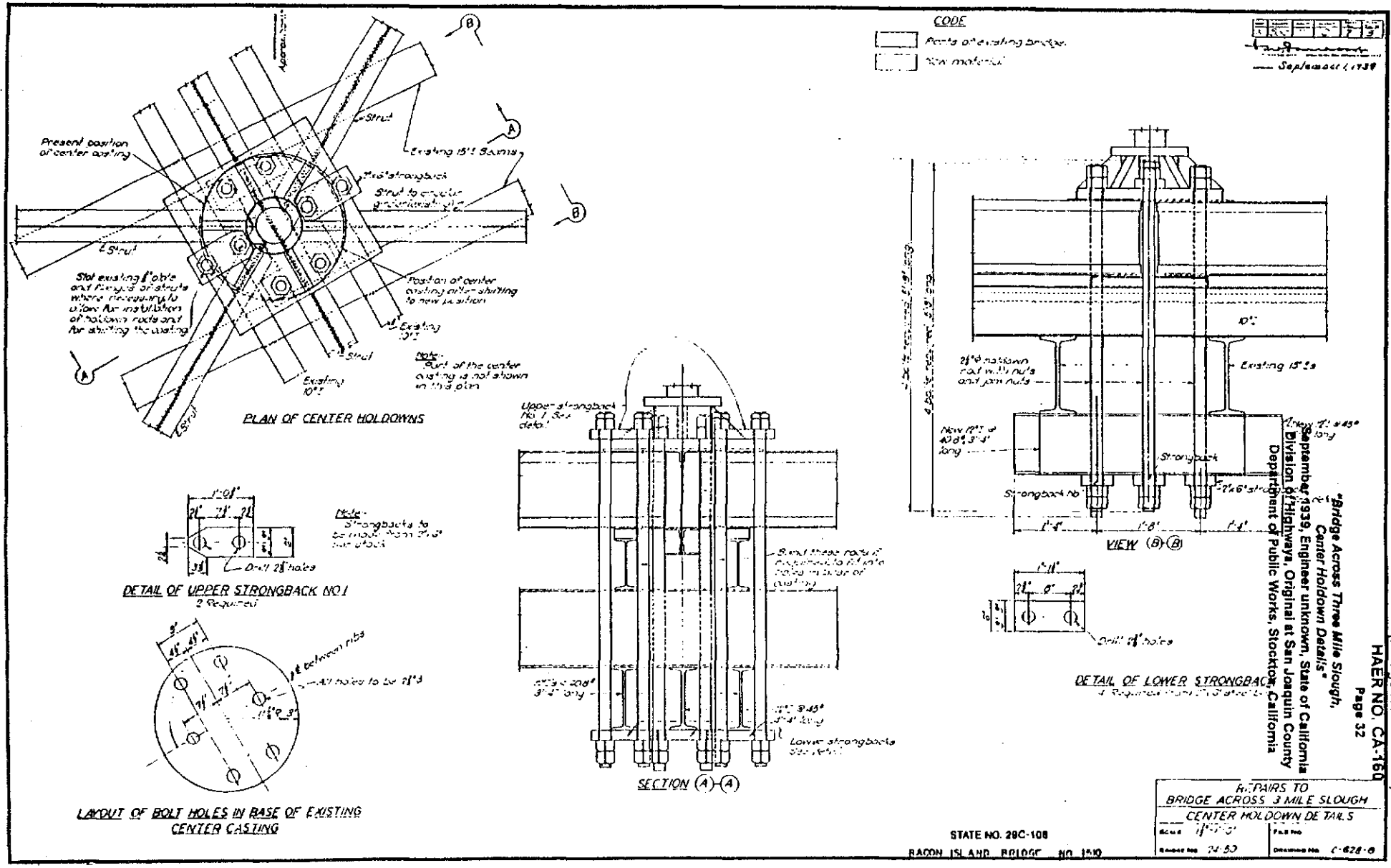




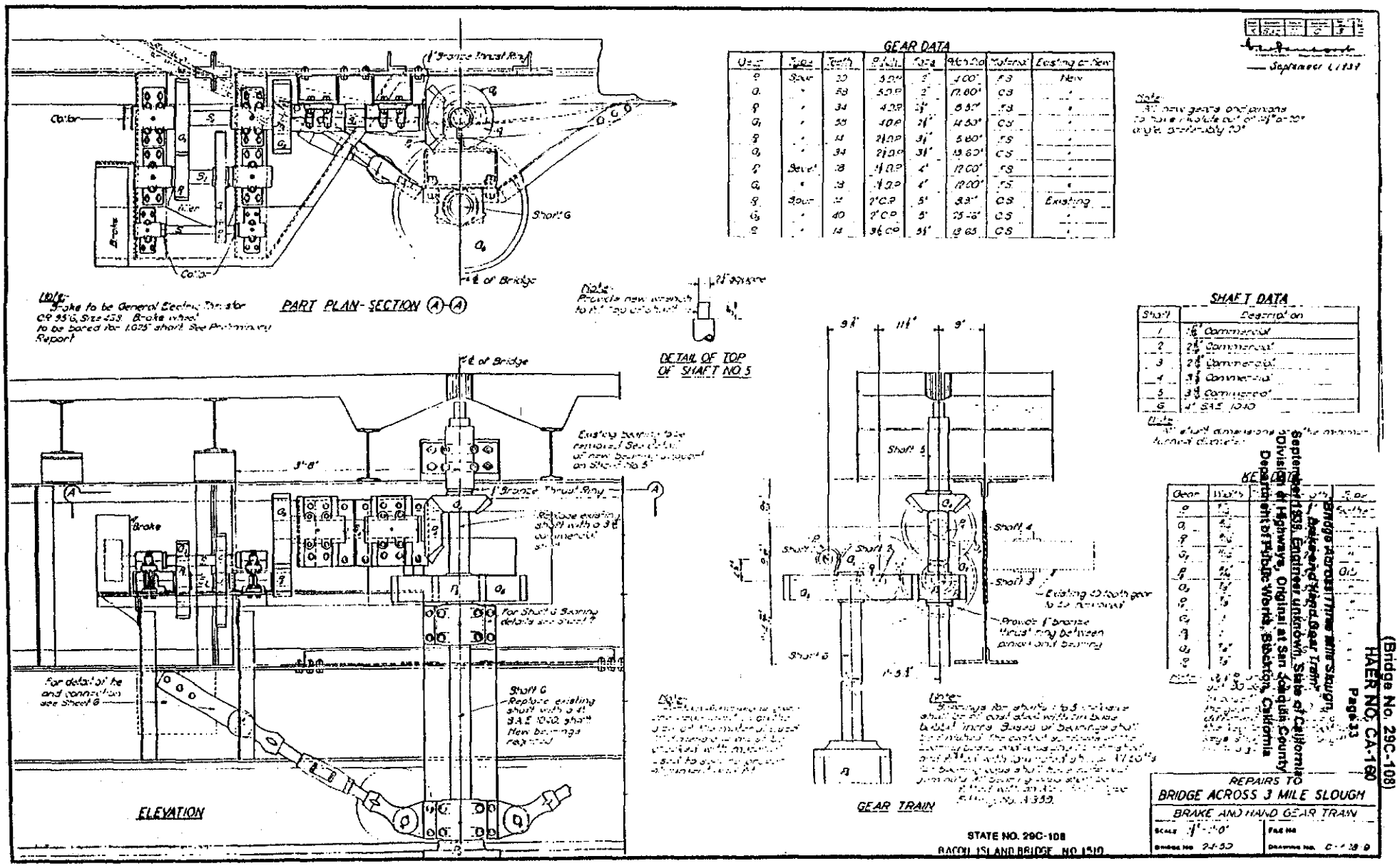
BACON ISLAND ROAD BRIDGE
(Bridge No. 29C-108)
HAER NO. CA-160
Page 30

"Bridge Across Three Mile Slough, Detail of Horizontal Ties"
September 1939, Engineer unknown, State of California Division of Highways, Original at San Joaquin County Department of Public Works, Stockton, California





BACON ISLAND ROAD BRIDGE
(Bridge No. 29C-108)
HAER NO. CA-160
Page 32



BACON ISLAND ROAD BRIDGE
(Bridge No. 29C-108)
HAER NO. CA-190
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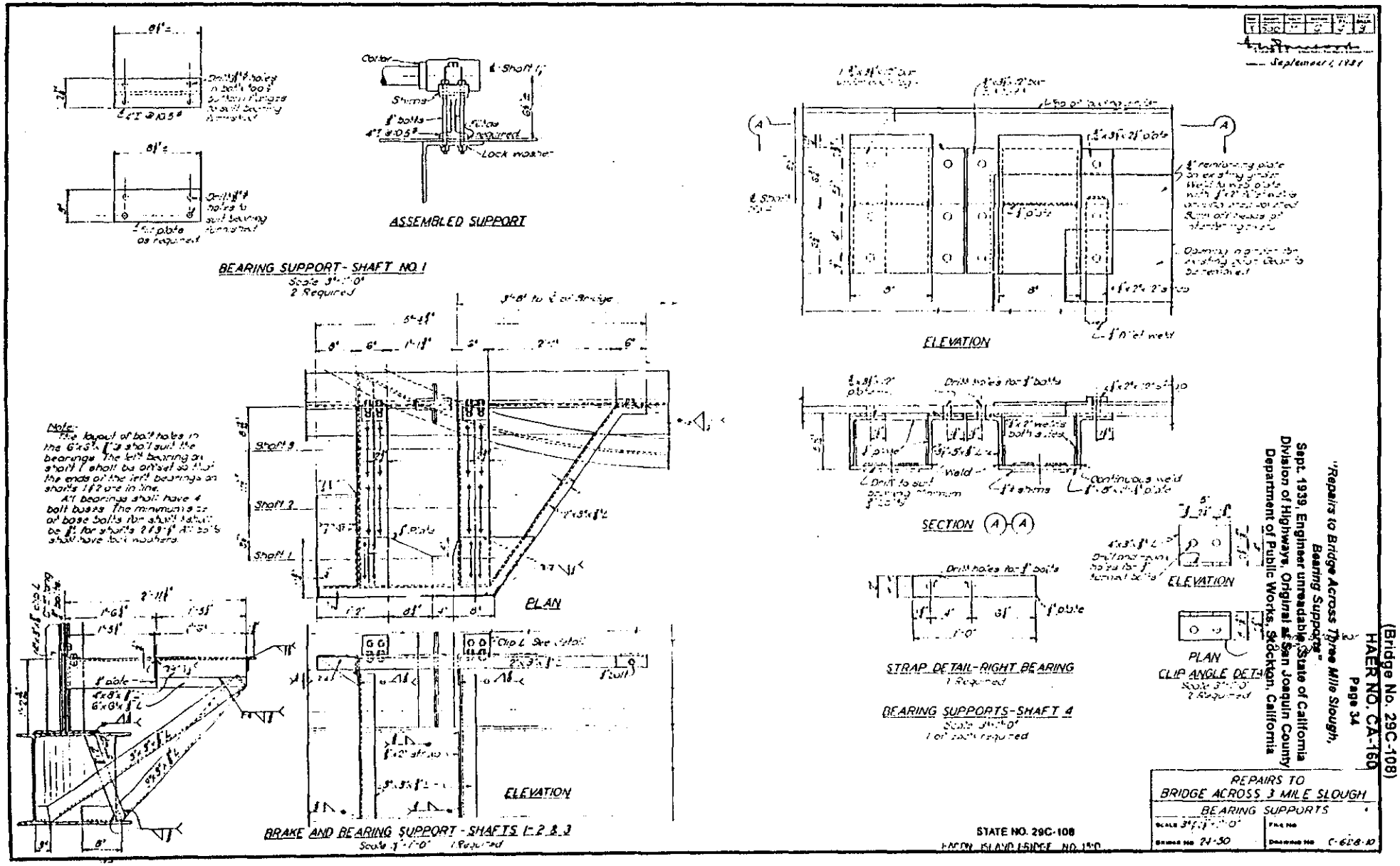
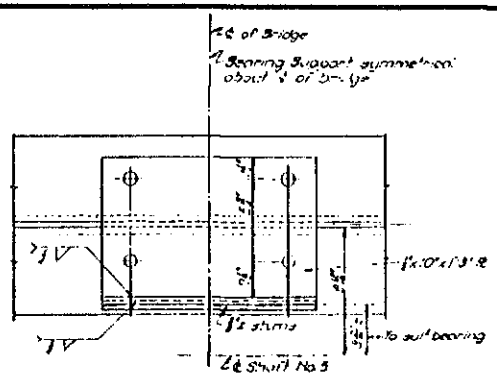
"Repairs to Bridge Across Three Mile Slough, Bearing Supports"
Sept. 1939. Engineer unreadable. State of California
Division of Highways. Original at San Joaquin County
Department of Public Works, Stockton, California

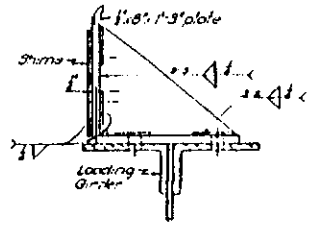


REPAIRS TO
BRIDGE ACROSS 3 MILE SLOUGH
BEARING SUPPORTS
Scale 3"=1'-0" | File No.
Drawing No. 24-50 | Drawing No. C-608-10

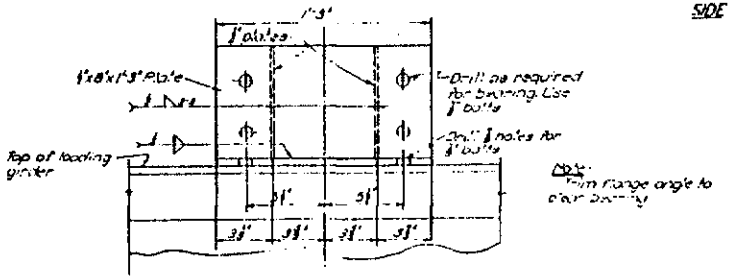
STATE NO. 29C-108
BACON ISLAND (SIDE) NO. 15.0



PLAN

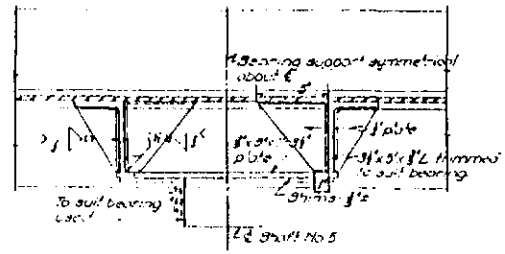


SIDE ELEVATION

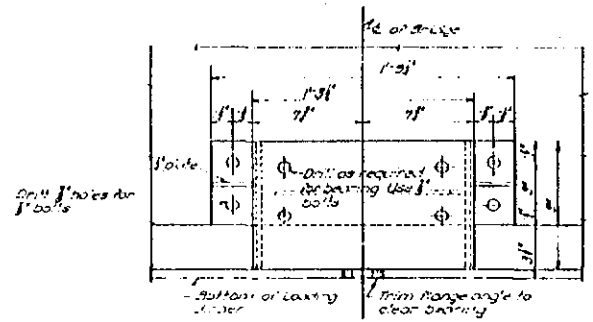


ELEVATION

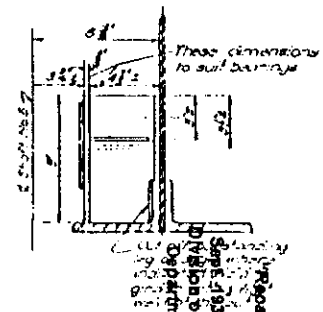
DETAIL OF UPPER BEARING SUPPORT - SHAFT NO 5
Scale 3"=1'-0"
1 Required



PLAN



ELEVATION



SIDE ELEVATION

DETAIL OF LOWER BEARING SUPPORT - SHAFT NO 5
Scale 3"=1'-0"
1 Required

— September 1, 1939

"Repairs to Bridge Across Three Mile Slough, Bearing Supports - Shaft No. 5" Sept. 1939, Engineer unreadable, State of California Division of Highways, Original at San Joaquin County Department of Public Works, Stockton, California

REPAIRS TO
BRIDGE ACROSS 3 MILE SLOUGH
BEARING SUPPORTS - SHAFT NO 5
SCALE 3"=1'-0" FILE NO
DRAWING NO 24-53 DRAWING NO C-628-11

STATE NO. 29C-108
BACON ISLAND BRIDGE - NO. 1010

BACON ISLAND ROAD BRIDGE
(Bridge No. 29C-108)
HAER NO. CA-160
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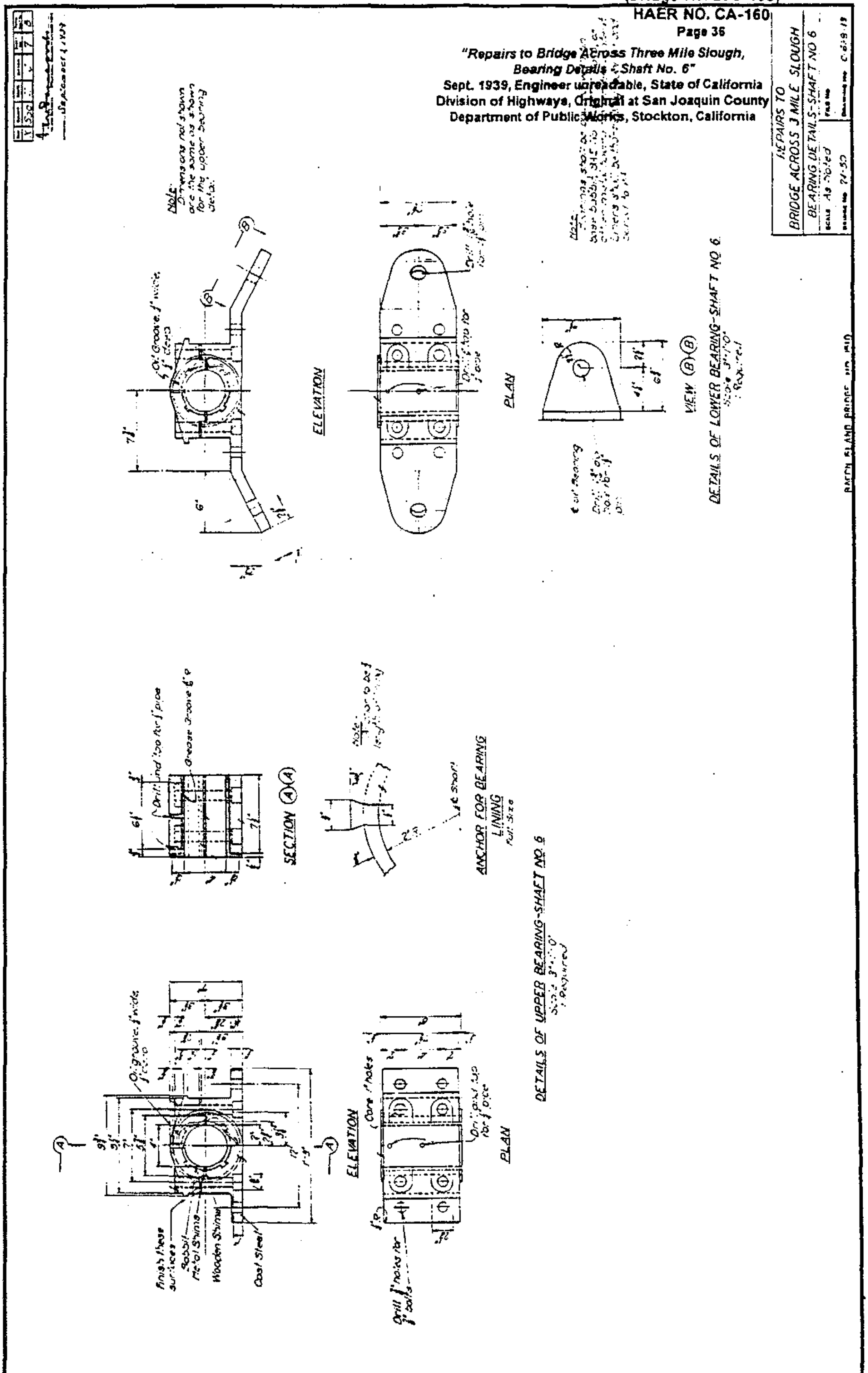
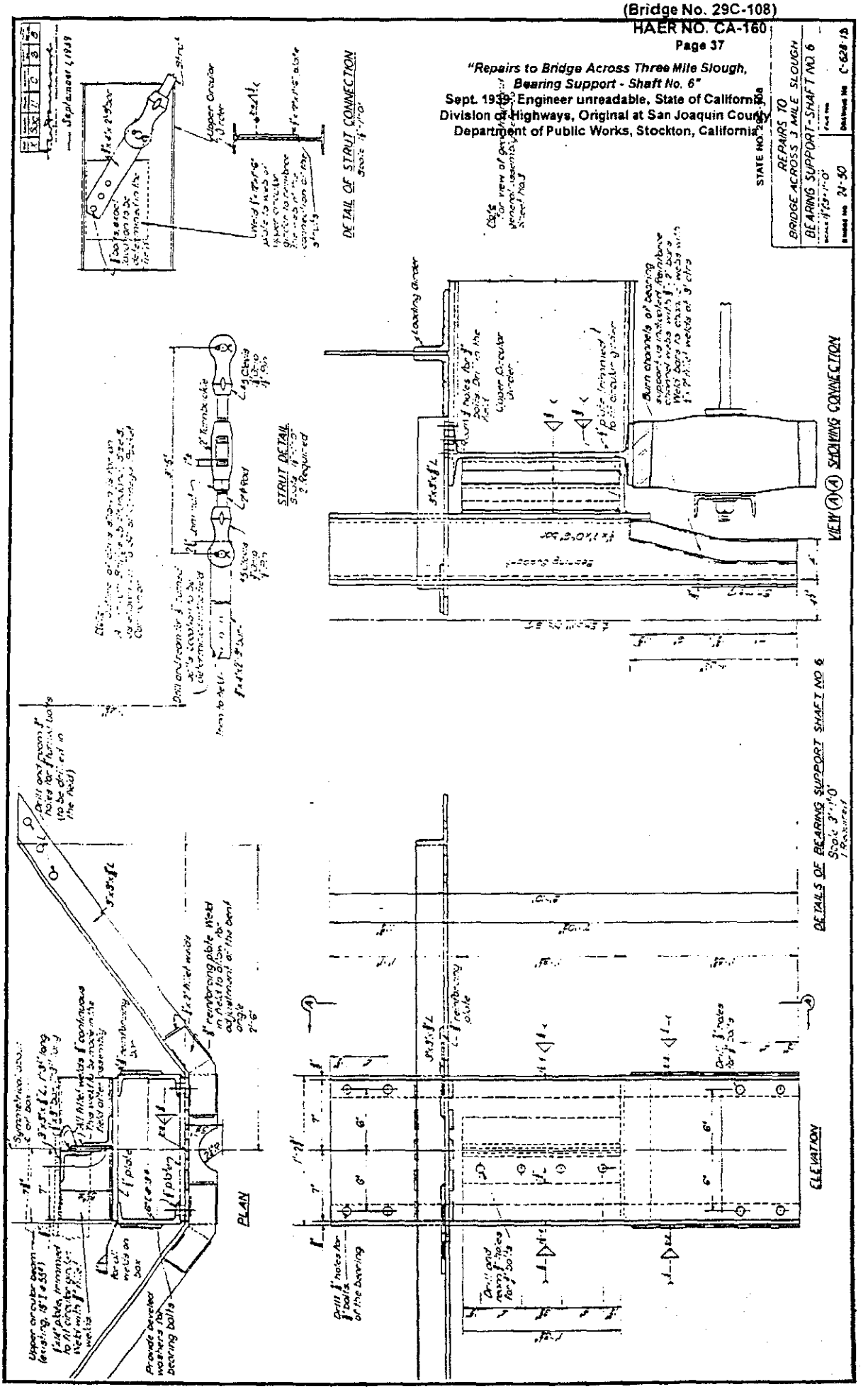
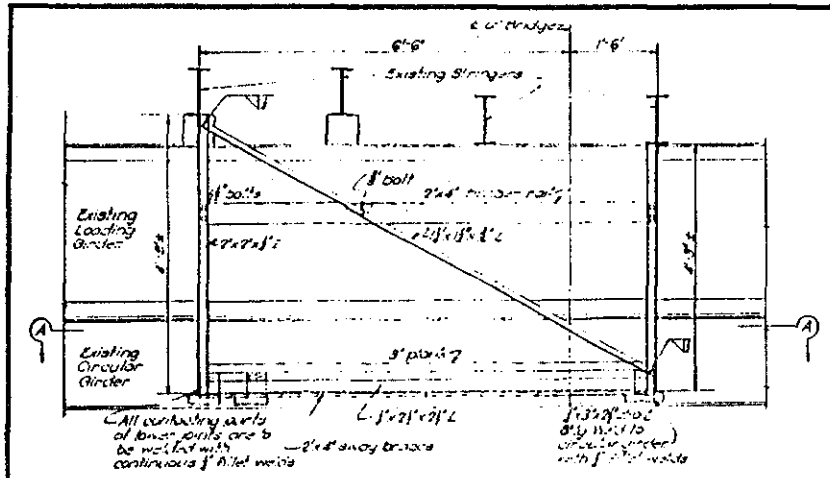
"Repairs to Bridge Across Three Mile Slough, Bearing Details - Shaft No. 6"
Sept. 1939, Engineer unreadable, State of California
Division of Highways, Original at San Joaquin County
Department of Public Works, Stockton, California



"Repairs to Bridge Across Three Mile Slough, Bearing Support - Shaft No. 6"
Sept. 1939 Engineer unreadable, State of California, Division of Highways, Original at San Joaquin County Department of Public Works, Stockton, California





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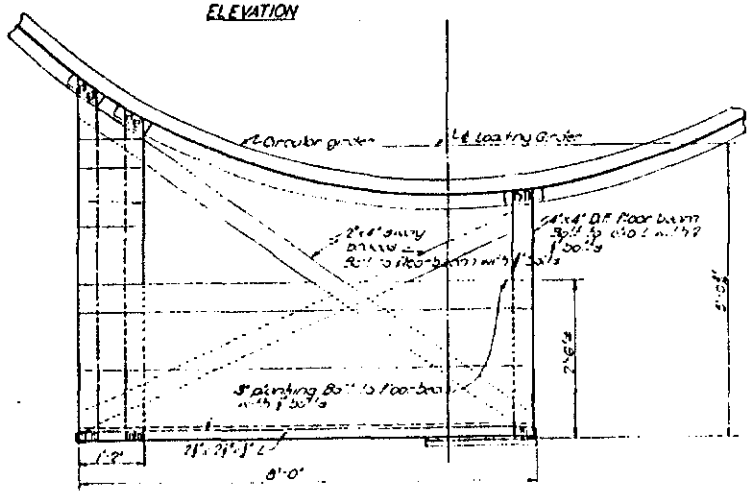
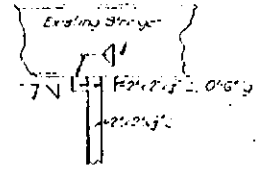
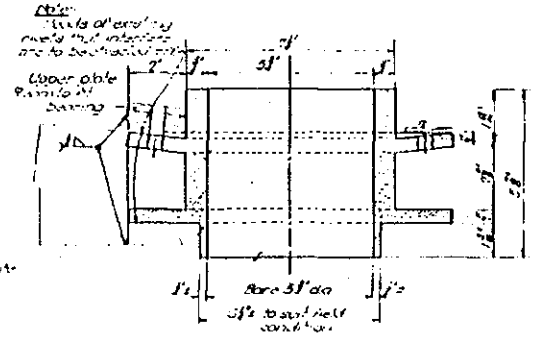


SECTION (A)-(A)

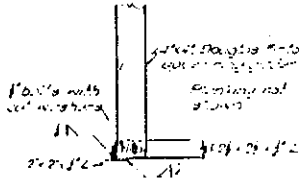
PLATFORM DETAIL



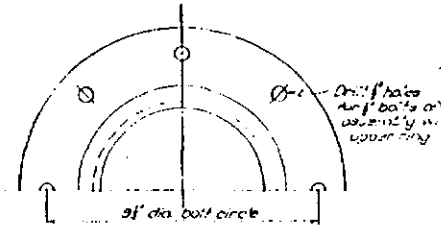
DETAIL OF UPPER CONNECTION



SECTION



DETAIL OF LOWER CONNECTION



HALF PLAN

DETAIL OF BEARING FOR CENTER CASTING AT THE CONNECTION OF THE STRUTS TO THE UPPER RING GIRDER

Scale: 6"=1'-0"
Required
Cast in high strength bronze

"Repairs to Bridge Across Three Mile Slough, Platform and Bearing Detail"
Sept. 1939, Engineer unreadable, State of California
Division of Highways, Original at San Joaquin County
Department of Public Works, Stockton, California

REPAIRS TO BRIDGE ACROSS 3 MILE SLOUGH
PLATFORM AND BEARING DETAIL
SCALE As noted
BRIDGE No. 29-50
DRAWING No. C-8-8-14

BACON ISLAND ROAD BRIDGE
(Bridge No. 29C-108)
HAER NO. CA-160
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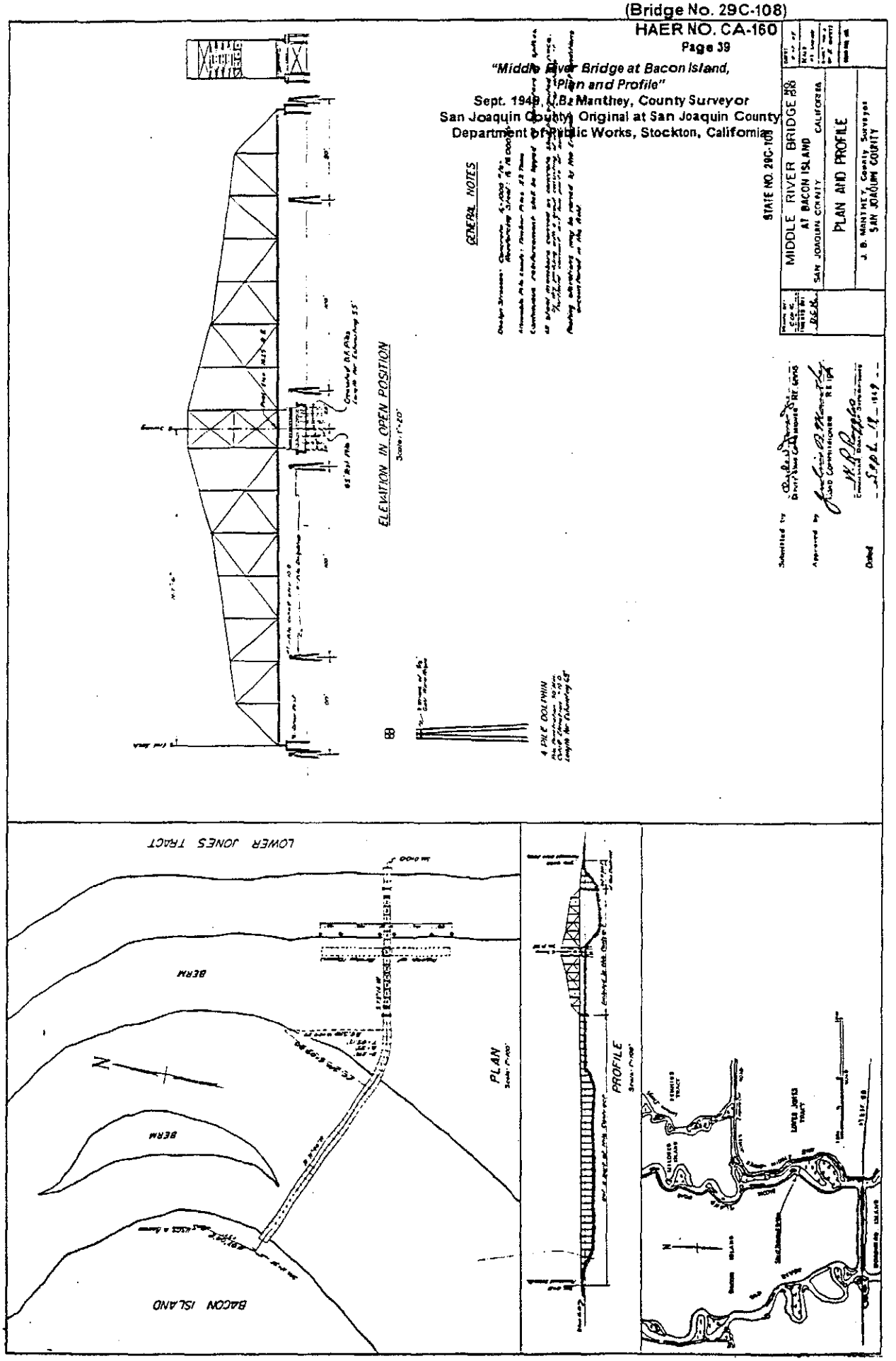
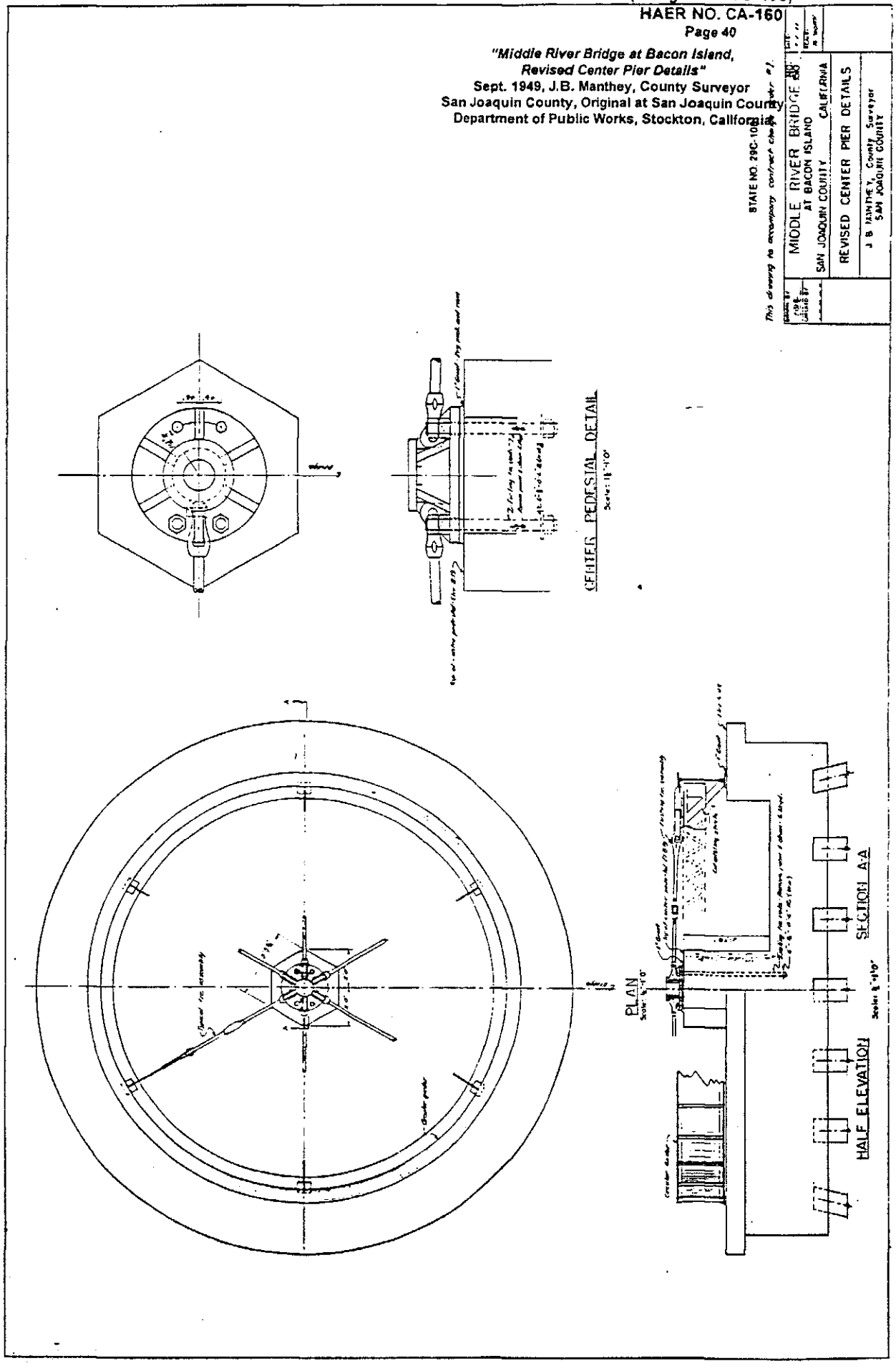
BACON ISLAND ROAD BRIDGE
(Bridge No. 29C-108)
HAER NO. CA-160
Page 39

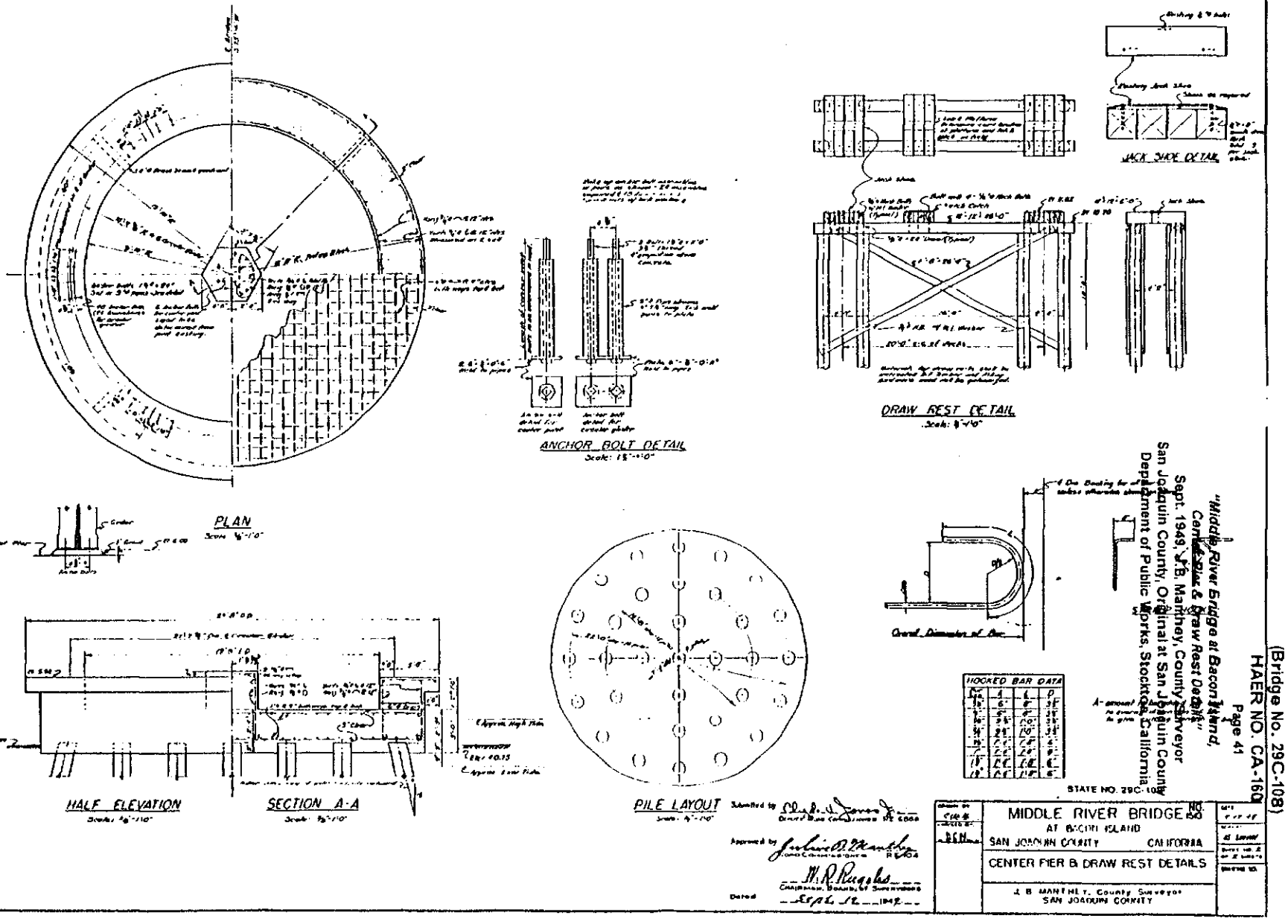
"Middle River Bridge at Bacon Island, Plan and Profile"
Sept. 1949, J.B. Manthey, County Surveyor
San Joaquin County Original at San Joaquin County Department of Public Works, Stockton, California



BACON ISLAND ROAD BRIDGE
(Bridge No. 29C-108)
HAER NO. CA-160
Page 40

"Middle River Bridge at Bacon Island, Revised Center Pier Details"
Sept. 1949, J.B. Manthey, County Surveyor
San Joaquin County, Original at San Joaquin County Department of Public Works, Stockton, California





"Middle River Bridge at Bacon Island, Center Pier & Draw Rest Details"
Sept. 1949, J.B. Manthey, County Surveyor
San Joaquin County, Original at San Joaquin County Department of Public Works, Stockton, California

BACON ISLAND ROAD BRIDGE
(Bridge No. 29C-108)
HAER NO. CA-160
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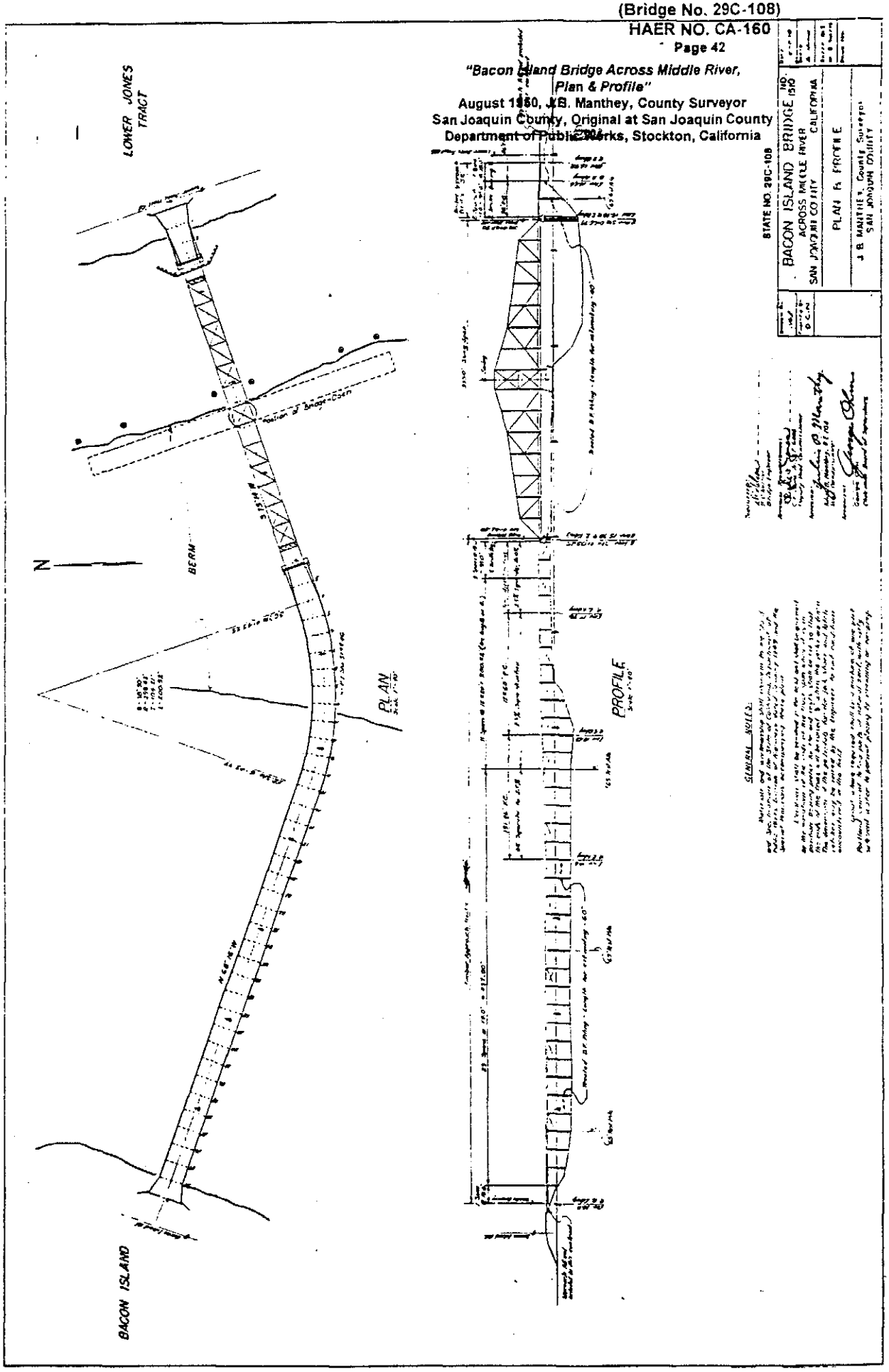
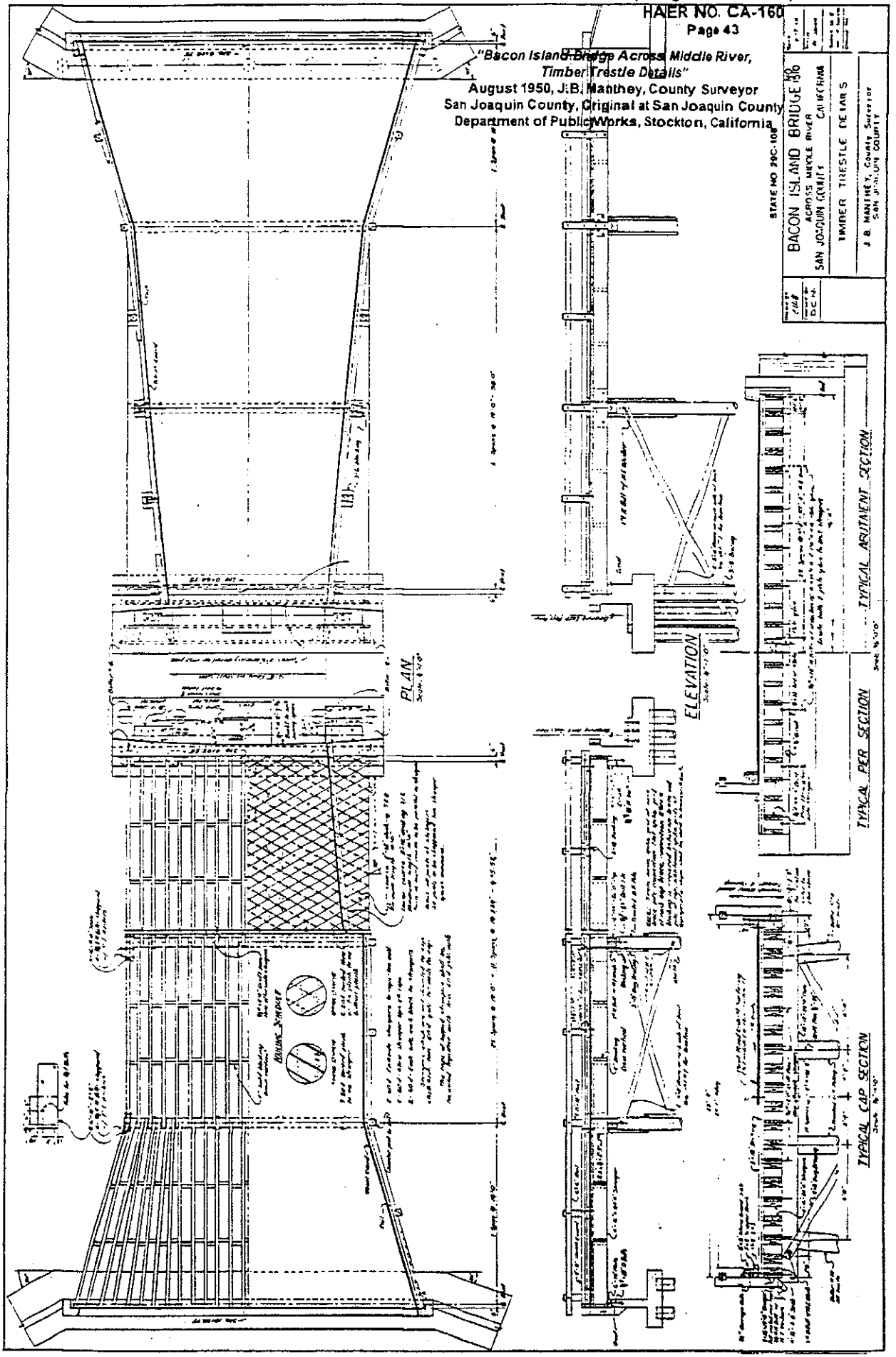
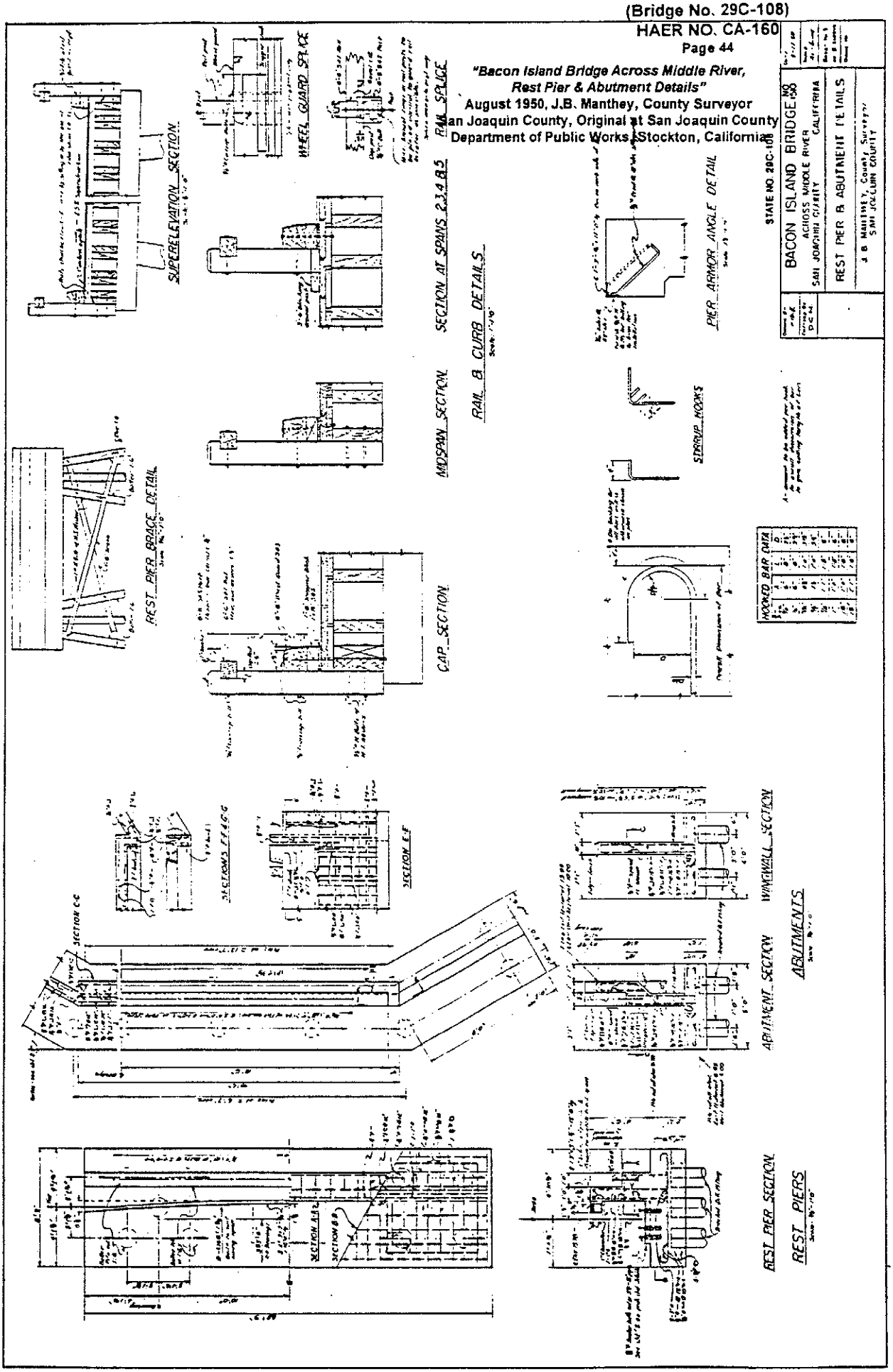
"Bacon Island Bridge Across Middle River, Plan & Profile"
August 1950, J.B. Manthey, County Surveyor
San Joaquin County, Original at San Joaquin County Department of Public Works, Stockton, California

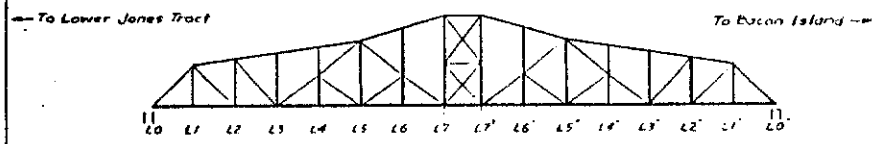




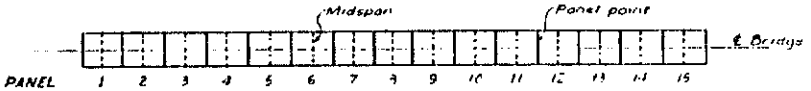
"Bacon Island Bridge Across Middle River, Timber Trestle Details"
August 1950, J.B. Manthey, County Surveyor
San Joaquin County, Original at San Joaquin County Department of Public Works, Stockton, California

"Bacon Island Bridge Across Middle River, Rest Pier & Abutment Details"
August 1950, J.B. Manthey, County Surveyor
San Joaquin County, Original at San Joaquin County Department of Public Works, Stockton, California

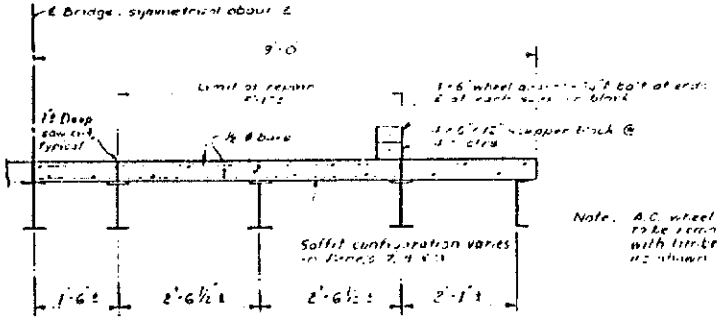




ELEVATION
Scale 1" = 30'-0"



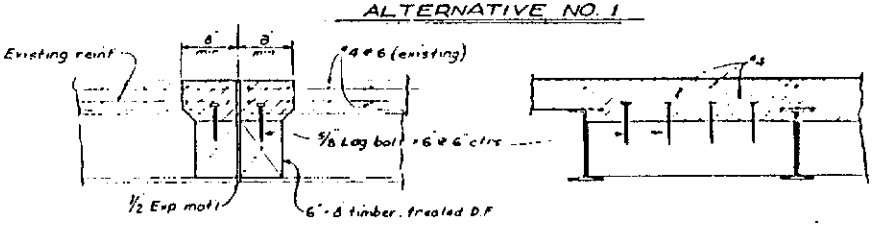
PLAN



TYPICAL SECTION
Scale 1" = 1'-0"

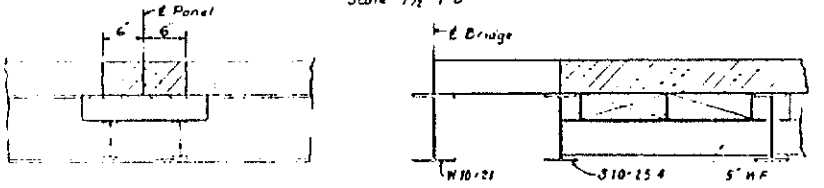
Note. A.C. wheel guard berm to be removed & replaced with timber wheel guard as shown

ALTERNATIVE NO. 1



JOINT ALONG ℄ BRIDGE
TRANSVERSE JOINT

REPAIR AT PANEL POINTS
Scale 1½"=1'-0"



JOINT ALONG ℄ BRIDGE
TRANSVERSE JOINT

REPAIR AT MID-PANEL
Scale 1½"=1'-0"

CONSTRUCTION NOTES - ALTERNATIVE NO. 1

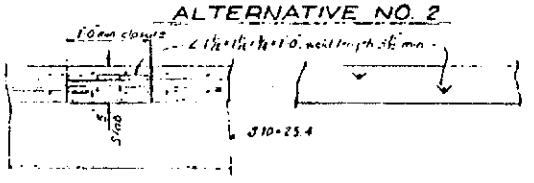
PANEL POINT JOINTS

1. Remove existing timber and blocking supports and install transverse D.F. timber resting on bottom of stringer flanges.
2. Cut back existing concrete deck 8" either side of joint to sound concrete.
3. Install ½" expansion joint material and lug bolts as shown.
4. Place ECC concrete or rapid setting cements (Fondu or Set-45).

MID-PANEL JOINTS:

1. Similar to above, except tighten existing timber planks or install new planks on top existing 5" ℄ transverse steel beams, shim up tight.
2. If transverse beams not in place, install 6"x8" timber in transverse direction.

ALTERNATIVE NO. 2



JOINT ALONG ℄ BRIDGE
TRANSVERSE JOINT
REPAIR @ PANEL POINT & PANEL MIDSPAN

CONSTRUCTION NOTES - ALTERNATIVE NO 2

1. Cut back concrete deck min 6" each side of joint to sound concrete. Cut back to be not less than 1'-0" to permit splicing of #4 rebar as shown.
2. Splice #4 rebar at all joints except at panel points L4 & L4'. Splice angle to be 1½"x1½"x¼"x1'-0" with 3½" min weld length.
3. Concrete at bulb closure to be 5" depth.
4. Install ½" expansion joint material for panel joints L4 & L4'.

"Untitled, Alternative No. 1 & Alternative No. 2"
Date Unknown, Engineer unknown, San Joaquin County,
Original at San Joaquin County
Department of Public Works, Stockton, California

APPENDIX "B"

HISTORIC AMERICAN ENGINEERING RECORD
INDEX TO MAPS
(JUNE 30, 1995)

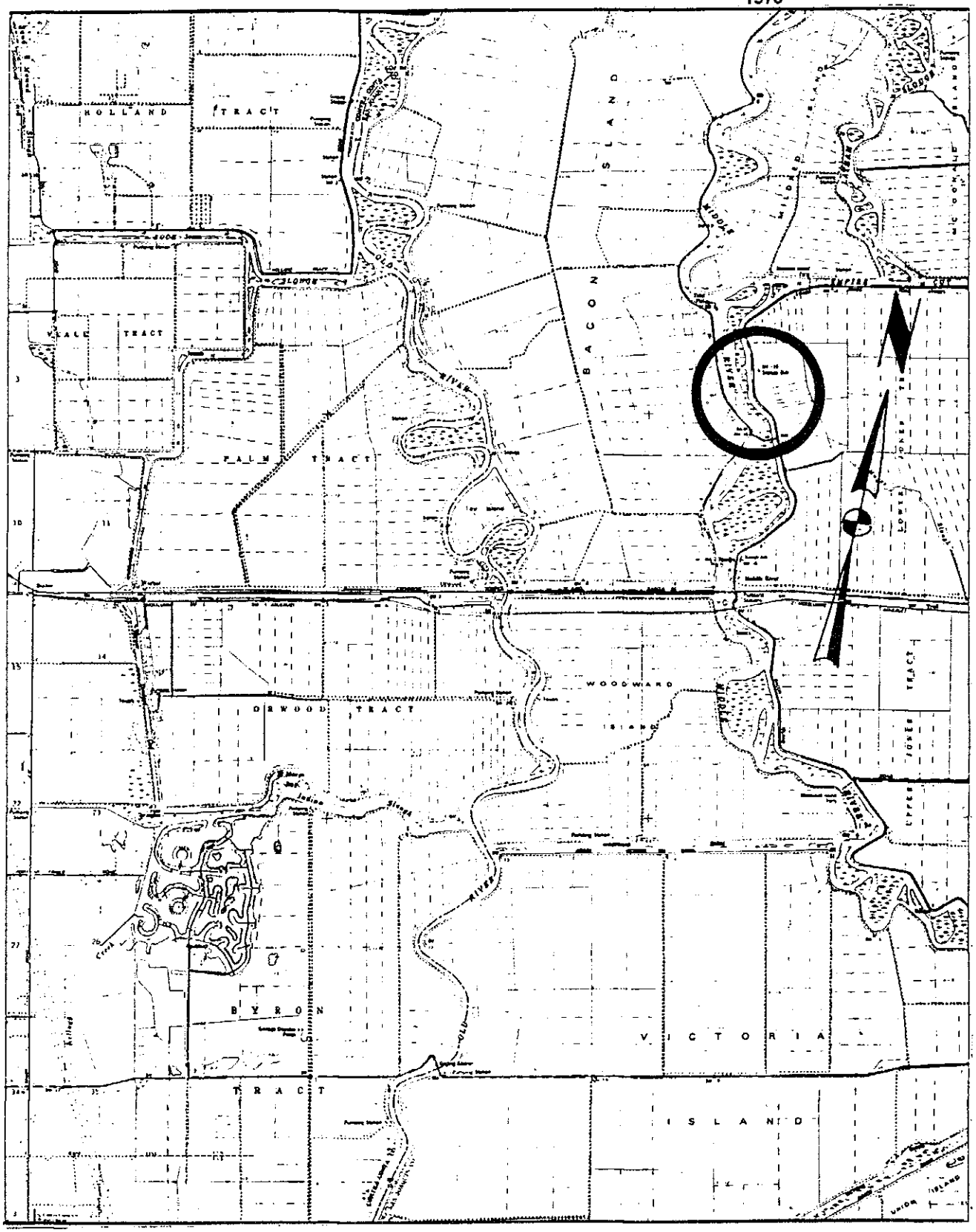
BACON ISLAND ROAD BRIDGE (Bridge No. 29C-108) spanning the Middle River at Bacon Island Road, between Bacon Island and Lower Jones Tract
Stockton Vicinity
San Joaquin County
California

RP-5B165.C5

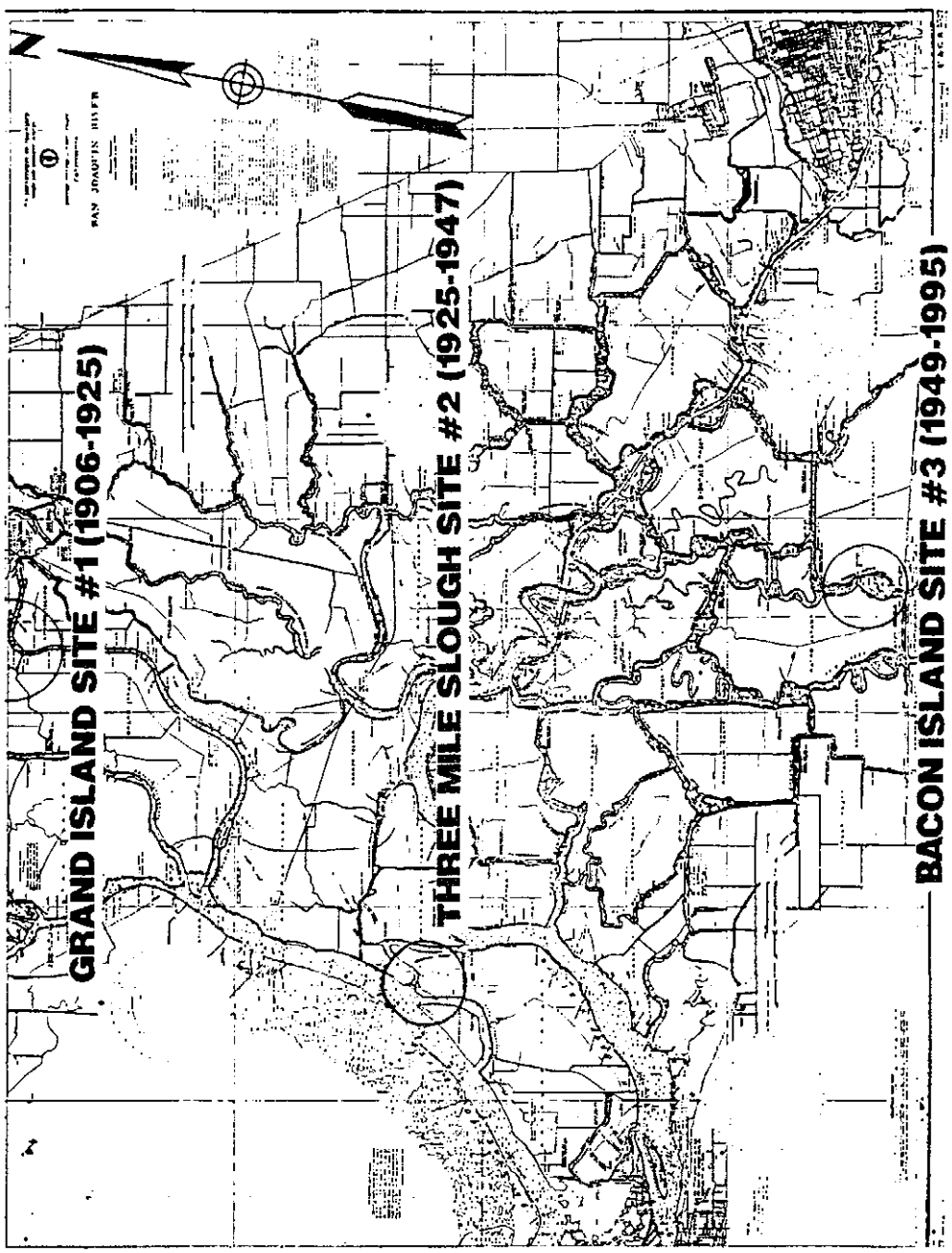
BACON ISLAND ROAD BRIDGE

(Bridge No. 29C-108)
HAER NO. CA-160
Page 48

"Woodward Island Quadrangle 7.5 Minute Series"
San Joaquin County, California
U.S. Department of the Interior Geologic Survey
1978



"San Joaquin River"
Sacramento & San Joaquin County, California
U.S. Department of Commerce Coast and Geodetic Survey
September 1965, 4th Edition Chart



BACON ISLAND ROAD BRIDGE

(Bridge No. 29C-108)
HAER NO. CA-160
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"Vicinity Map of Bacon Island Road Bridge"
San Joaquin County, California